

THE
NEW PC AT
CLONES

AUGUST 1985

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POPULAR COMPUTING

IMPROVING PRODUCTIVITY FOR MANAGERS AND PROFESSIONALS

DESK ACCESSORIES

MINI-PROGRAMS FOR MAXIMUM PRODUCTIVITY

HARDWARE REVIEWS:

AT&T's Powerful
Unix PC

Tandy's
XT-Compatible
1200 HD

Osborne's
Transportable Vixen

New Mac
Spreadsheets:
**MICROSOFT'S
EXCEL**

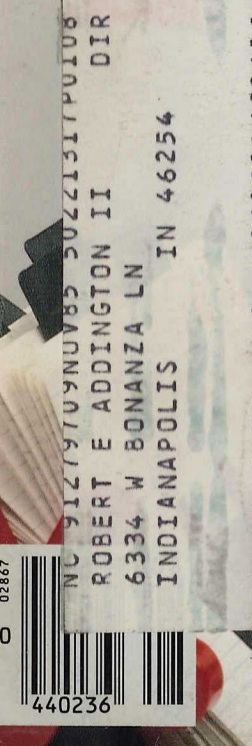
**LOTUS'S JAZZ
PALADIN'S**

SOFTWARE REVIEWS:

Ability:
Easy Integration
PFS: Access:
Painless
Communications
Factfinder:
Free-Form Filing

**IMPROVE
YOUR
BUSINESS
GRAPHICS**

**HOW TO LINK
YOUR MICRO
TO A MAINFRAME**



NEC PRINTERS. THEY YOU WANT THEM TO.



Color Pinwriter CP2 dot matrix printer.

NEC printers are incredibly reliable.

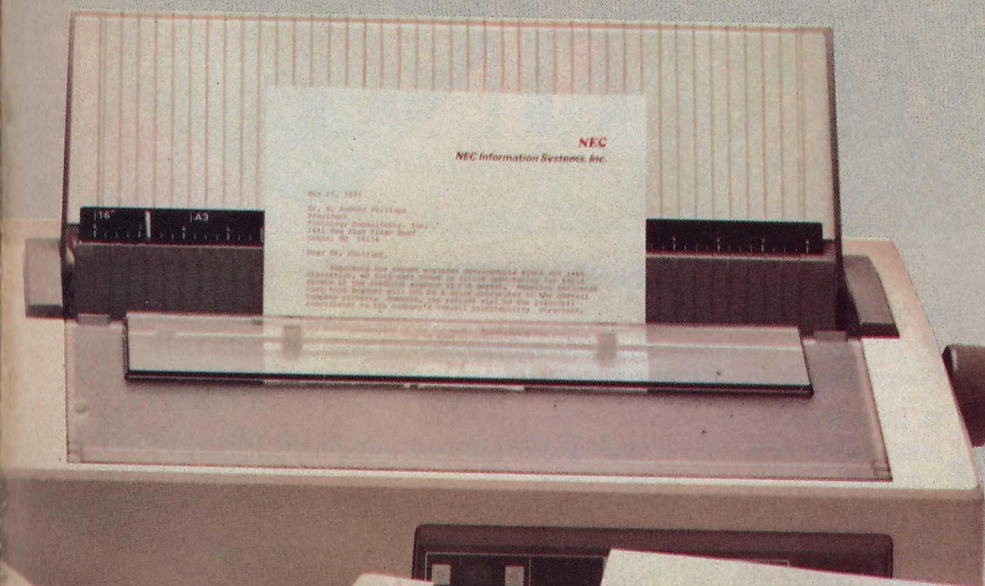
In fact, with normal use, an NEC printer can run an average of 5 years before it needs a repair. And chances are that repair will take only about 15 minutes.

To become that reliable, an NEC printer has to go through some of the most demanding tests in the industry.

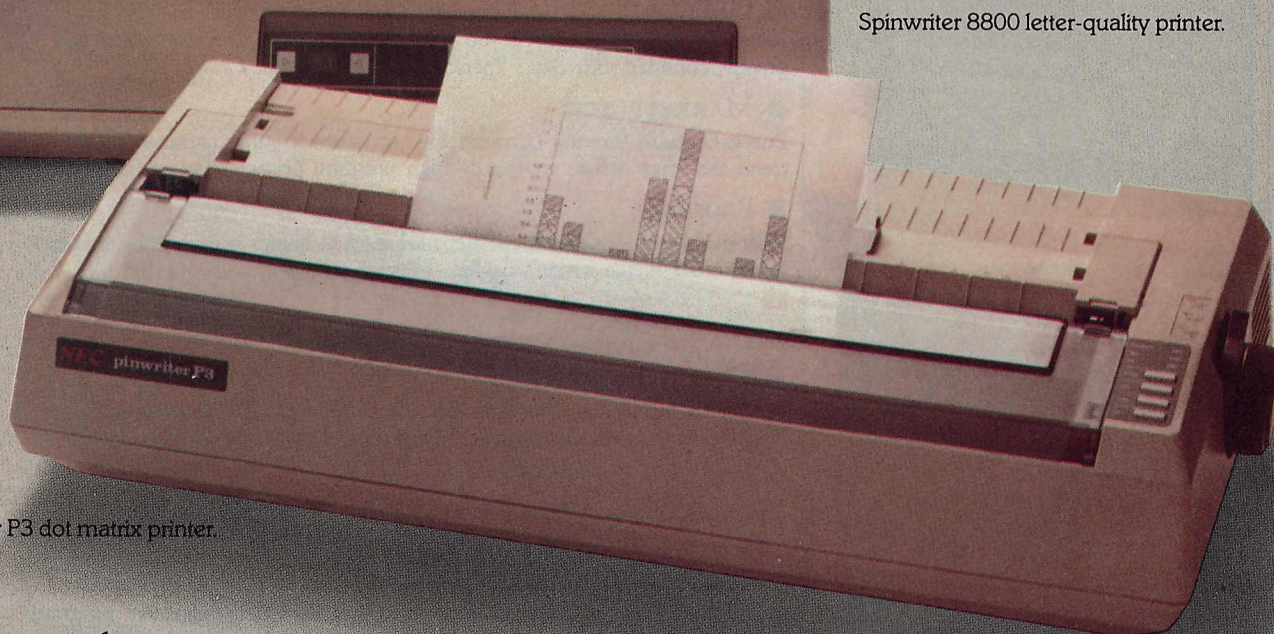
First, we test every single part before it goes into the printer. Then we test the printer itself. Nothing is forgotten. Nothing is left to chance.

But reliability is only part of the story. There's much more. Our printers are compatible with every popular PC. With more leading software programs. And with more forms handlers to make

ONLY STOP WHEN



Spinwriter 8800 letter-quality printer.



Pinwriter P3 dot matrix printer.

paperwork a snap.

So no matter what your printing needs—and no matter what size your budget—NEC has a printer for you. Our full line of Spinwriter® printers, for low to high speed letter quality printing. And our versatile Pinwriter™ and Color Pinwriter printers, for high resolution dot matrix printing.

To find out more about NEC printers, call 1-800-343-4418 (in Mass. 617-264-8635). Or write: NEC Information Systems, Department 1610, 1414 Massachusetts Ave., Boxborough, MA 01719.

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NEC Information Systems, Inc.

Inquiry 27

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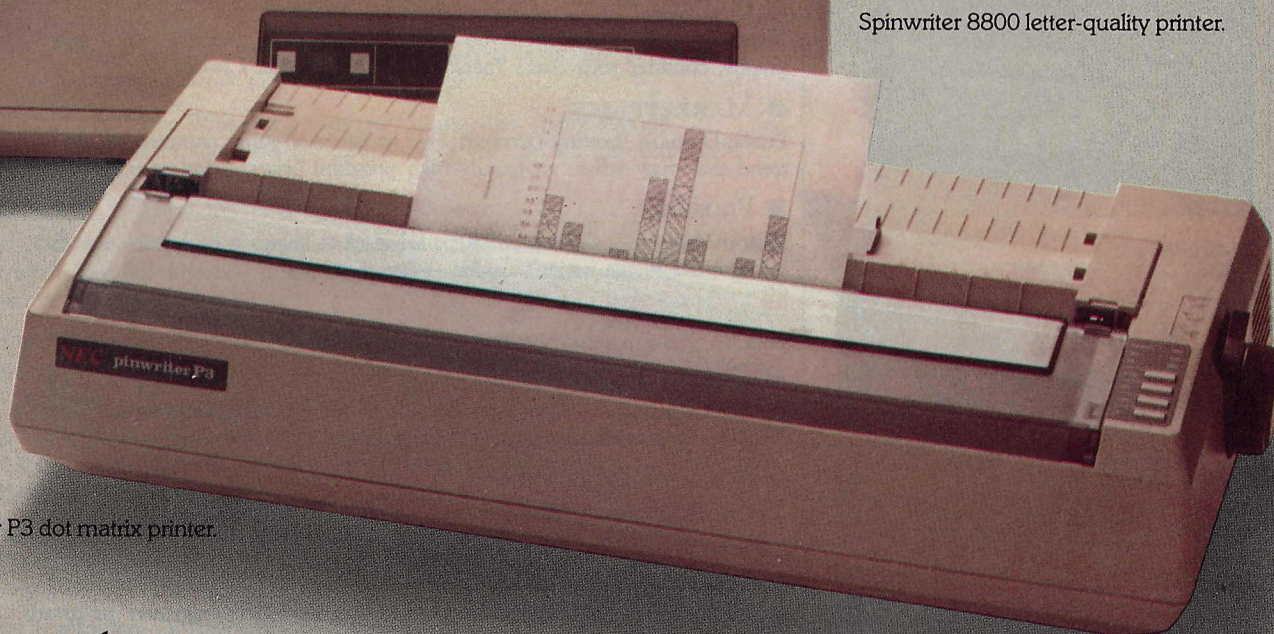
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Improving Productivity for Managers and Professionals



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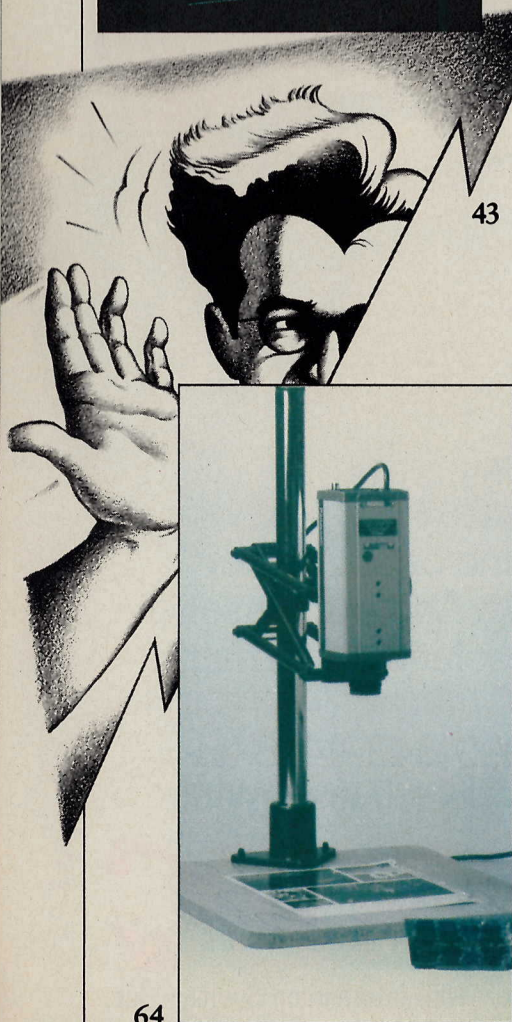
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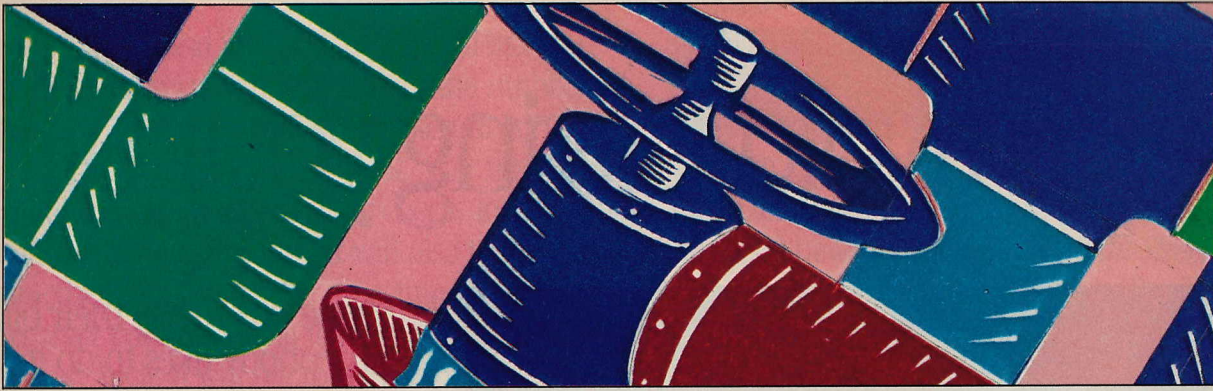
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The Tandy 1200 HD: A mirror image of the IBM PC XT, this bargain-basement-priced machine built by Tandon runs all the important software written for the IBM —*Jonathan Sacks*

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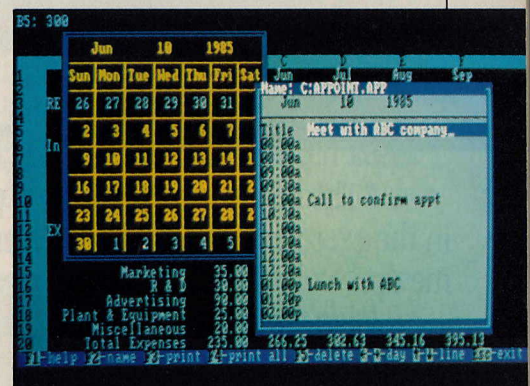
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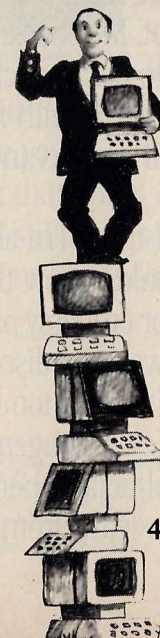
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How to avoid paying your bills.

by Alan Greenspan



Alan Greenspan, Famous Economic Advisor

"The other day, a prominent politician in the executive branch of our government phoned me up.

'Alan', he said to me, 'the budget is a mess.'

'No joke', I said.

'Not that budget', the prominent politician continued. 'My budget. My checking's overdrawn. They're threatening to disconnect my phones. I even got into a shouting match with my wife when I tried to lay off the servants.'

'Civil?'

'Not very. And I think I'm about to be audited. What would I show them? Who keeps receipts for embassy parties?'

At this point, we were disconnected. And although it was too late to teach proper money management to this prominent politician, there is a lesson all of us can learn from his misfortune.

Everyone has to pay their bills, and nobody likes to do it.

You can keep file folders full of bills, drawers stuffed with grocery receipts, envelopes brimming with cancelled checks, and at the end of the month, it still takes hours to figure out just where your money has gone. Not to mention how long it takes to straighten things out at the end of the year.

Well, after years of financial consulting, I've discovered a way to avoid paying your bills: let an Apple® II Personal Computer pay them for you.

There are several advantages to letting an Apple handle your finances.

It will save you time.

It will organize everything.

It will tell you, at a glance,

exactly what is going on with your money.

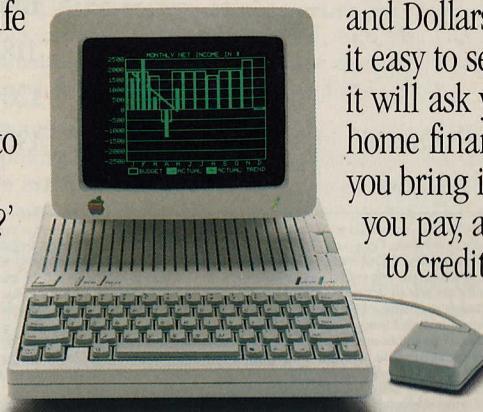
It will pay your bills, and never send you any.

And now, I'd like to turn the page over to those nice people at Apple, who will explain, in their own excruciating detail, just what I'm talking about."

The Apple II and the Home Budget.

With software programs like The Home Accountant™ and Dollars & Sense™, the Apple II makes it easy to set up household books. First, it will ask you some questions about your home finances. Like how much money you bring in each month, how much rent you pay, and whether you owe money to credit card companies, mortgage

holders, or any other surly characters. Then, it will ask you to enter some of the bills you receive each month whose prices may vary:



An Apple II will take care of everything from your household budget to your taxes with software programs like Dollars & Sense, The Home Accountant, and Tax Preparer.

phone, utilities, and the like. Then, it will ask you where you keep your money, and for the numbers of your various checking and savings accounts.

That's really all there is to it. After that, an Apple II can automatically write checks for all your fixed expenses each month. It will also tell you what other bills you can be expecting, and when you enter their costs, an Apple II will pay them, too.

An Apple II will see to it that your checkbooks remain balanced, and that you'll know when your expenses are about to exceed your income. It can even help you plan to buy a new car. Or a home.

Or a fur-lined boat, if your budget permits.

How to avoid your banker.

After the Apple II writes your checks, it can call your bank with the help of your telephone and an Apple modem. And faster than a teller can say "Next window,

With our Scribe® color/graphics printer, you can automatically print out your own checks—not to mention reports, papers, almost anything. Except money.

please," you can find out all your balances, enter deposits, see what checks have cleared, transfer money from one account to another, and even pay off some of your credit cards and other bills electronically—without ever writing a check.

So the only time you'll have to go to the bank is when you want to visit with your money, personally.

Which, when done in moderation, we can recommend most highly.

The Apple II and making money.

An Apple II can do wondrous things for your personal finances. With several different software programs, you can become your own stockbroker. Again, by



This is an Apple modem. Not much to look at, we admit, but it does let you pay bills and trade stocks by phone. It also connects your Apple II to a wealth of information services, like THE SOURCESM and CompuServe[®].

using an Apple modem, you'll gain instant access to financial news sources like *The Wall Street Journal*, *Barrons*, and the Dow Jones News/Retrieval[®] service. Find out what they've been saying on *Wall Street Week*. And in most cases, get up to the minute price quotes on over six thousand stocks, options, and other securities.

An Apple II lets you buy and sell securities right in your home or office, at the moment you want to make the trade. It automatically updates your portfolio and gives you detailed holding reports. It even produces charts and graphs, so you can quickly see how you and your investments are doing.

A little tax relief.

If you become perturbed everytime the subject of doing taxes comes up, an Apple II can do them for you with programs like Forecast[™] and Tax Preparer[™].

It can store your records, plan for the next year, and calculate your taxes.

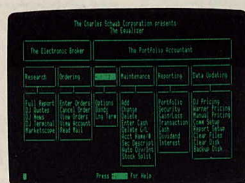
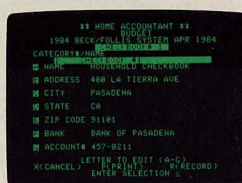
You'll be alerted to payments you've made over the year that may be tax-deductible. It even keeps year-round records, automatically updating totals and making corrections for you. It will even print out completed tax forms that the I.R.S. will accept.

And it can do about 10,000 other things totally unrelated

to taxes or this ad. So there's no telling how far an Apple II can take you.

"Well, I think that about covers it. And what if, after all of this, you still have some money left over?

Congratulations. You're doing a lot better than the government."



It can manage your entire stock portfolio with programs like Dow Jones Investor's Workshop[™] and Charles Schwab and Company's The Equalizer[™]. It can even show you what's going on in your bank account.*



* A note to Dr. Greenspan's relatives: He says, "Don't get excited. This isn't my real bank account." © 1985 Apple Computer, Inc. Apple and the Apple logo are registered trademarks of Apple Computer, Inc. The Home Accountant is a trademark of Continental Software. Dollars & Sense and Forecast are trademarks of Monogram. Dow Jones News/Retrieval and Dow Jones Investor's Workshop are trademarks of Dow Jones and Company, Inc. Tax Preparer is a trademark of Howard Software Services. Scribe is a registered trademark licensed to Apple Computer, Inc. THE SOURCE is a service mark of Source Telecomputing Corporation, a subsidiary of the Reader's Digest Association, Inc. CompuServe is a trademark of CompuServe Corporation, an H & R Block Company. The Equalizer and Equalizer are trademarks of Charles Schwab & Company, Inc. Spectrum is a registered service mark of the Chase Manhattan Corporation. For an authorized Apple dealer near you call (800) 538-9696. In Canada, call (800) 268-7796 or (800) 268-7637.

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Waiting for someone to ask it to dance in the ballroom called business.

And yet all the business software in the world couldn't teach Macintosh how to do much more than the boxstep.

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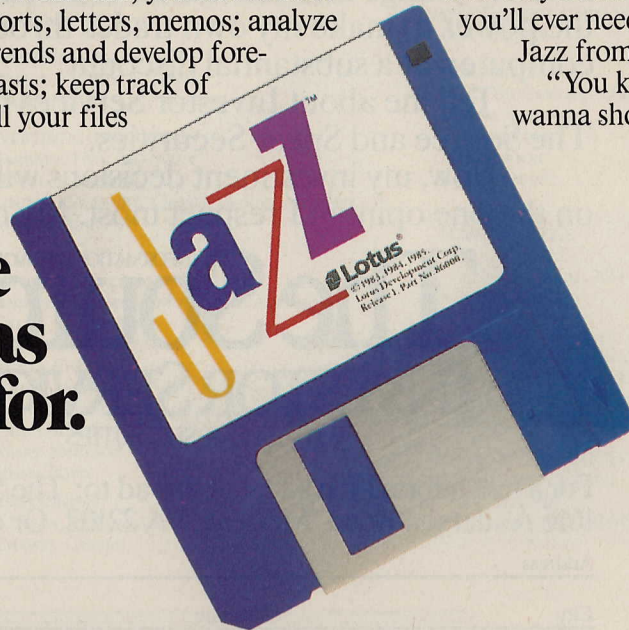
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Whether you use all functions or just one to get the job done, Jazz may be the only software you'll ever need.

Jazz from Lotus.

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Macintosh was
invented for.**



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Ven-Tel 1200 PLUS

Hayes

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Yes	Yes
Yes	No
Yes	Yes
Yes	Yes
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Yes	No
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Yes	No
Yes	Yes
Now	

Price

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\$599

The Ven-Tel 1200 PLUS offers high speed, reliable telecommunications for your personal computer or terminal. Whether you use information services or transfer data from computer to computer, the Ven-Tel 1200 PLUS is the best product around. Available at leading computer dealers and distributors nationwide.

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RANDOM

NEWS, BUSINESS, TELECOMPUTING, ISSUES, INDUSTRY
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ACCESS

It sounds like the title of a grade-B horror movie, but "Invasion of the AT Clones" aptly summarizes recent news from personal computer manufacturers. At press time more than half a dozen firms had unveiled new machines designed to be compatible with IBM's PC AT, and others are expected to announce their own AT compatibles in the near future.

We've seen this sort of trend before, of course, with dozens of machines claiming compatibility with IBM's original PC. Pinning their success on the ability to handle the huge library of programs and plug-in expansion boards designed for the PC, those compatibles filled dealers' shelves and led to de facto standardization in the marketplace. Compaq, Zenith, and a few others rode the wave and became quite adept at selling PC clones, but other companies learned instead about overstocked inventories and the intricacies of Chapter 11.

Now we're seeing the beginning of a new wave—machines that accept software and hardware designed for the more powerful IBM PC AT. Like their model, these machines are based on Intel's 80286 central processor, a chip that addresses more memory and runs much faster than the PC's 8088 but still handles

NEWS

AT Clones Proliferate



WITH ITS DESK-
PRO 286, COMPAQ
HOPES TO FURTHER
ITS REPUTATION
IN COMPATIBLES.

desktop AT clones this spring. Known, respectively, as the Compaq Portable 286 and the Compaq Deskpro 286, the machines use an 8-MHz 80286 central processor, which is faster than the 6-MHz 80286 chip used in the AT itself. With only one memory expansion unit, the portable machine can address as much as 2.6 megabytes of RAM. A unit with 256K bytes of RAM, a 9-inch monochrome monitor, a single 1.2-megabyte floppy-disk drive, parallel and serial

most of the software written for the older machine. The AT clones typically accept higher-capacity floppy disks with up to 1.2 megabytes of storage (while still working with the old 360K-byte floppy disks), and they also accommodate larger, faster hard-disk drives.

The first AT compatibles to be announced were the Kaypro 286i (May Observations, page 19) and the Texas Instruments Business Pro (July News, page 11). But their head start has been brief as other introductions followed in short order.

Compaq, the most successful manufacturer of PC compatibles, introduced both portable and

SPEED IS THE ITT
XTRA XP's FORTE.



ports, a clock, and three open expansion slots sells for \$4499; one with 640K bytes of RAM, a 20-megabyte hard-disk drive, and two open slots costs \$6299.

The Deskpro 286 can address up to 8.2 megabytes of RAM. It has five open slots on the 256K-byte, floppy-based version, which sells for \$4244 without a monitor or \$4499 with a 12-inch monochrome unit. A model with 512K bytes of RAM, a 30-megabyte hard-disk drive, and four open slots retails for \$5999 (\$6254 with the monitor).

Another entry comes from Televideo, whose AT compatible is also based on the 8-MHz 80286 chip. Like the IBM machine, Televideo's has eight expansion slots—six "AT-compatible" slots and two compatible with PC and XT boards. Televideo expects to sell its AT compatible primarily through value-added resellers. A 256K-byte, floppy-disk-based unit with a 14-inch monochrome monitor costs \$3395, and the price of a 512K-byte version with a 20-megabyte hard disk is set at \$4795.

Zenith Data Systems uses the 6-MHz 80286 chip in its AT-compatible Z-200 Advanced PC, which comes with 512K bytes of RAM that can be expanded to 16 megabytes. The desktop machine can accommodate up to two floppy and three hard-disk drives. The Z-200 Advanced PC sells for \$3999 with a single 1.2-megabyte floppy-disk drive and \$5599 with a 20-megabyte hard disk.

Corona Data Systems' ATP, a transportable AT compatible, uses a 6-MHz 80286 processor and a monochrome monitor with a resolution of 640 by 400 pixels, twice that of the standard IBM PC AT and most of its clones. An ATP with 512K bytes of RAM and two floppy-disk drives (one 360K-byte and one 1.2-megabyte) sells for about \$4500; a version with a 1.2-megabyte floppy-disk

drive and a 20-megabyte hard disk costs about \$5500.

NCR's entry, a desktop unit that also comes with a 6-MHz 80286, has eight expansion slots. Like most of the AT compatibles, it can function not only as a single-user machine but also as part of a multiuser system when equipped with the Xenix operating system. Called the PC8, the basic machine with 256K bytes of RAM and a 1.2-megabyte floppy-disk drive lists for \$3795; an enhanced version with 512K bytes of RAM (expandable to 4 megabytes) and a 20-megabyte hard disk costs \$5505.

Some firms are taking slightly different approaches with their 80286-based products. ITT Information Systems has introduced the ITT Xtra XP, based on a 6-MHz 80286 processor. While the company says the XP is compatible not with the AT but with the older IBM PC XT, it stresses that its machine is 3½ times faster than the XT, faster even than the AT. The Xtra XP's 512K bytes of RAM is expandable to 640K bytes on the main circuit board, and an additional 1 megabyte of memory—useful as a RAM disk or with programs that access this extra memory through the 80286—is avail-

able on an optional board. The machine has five XT-compatible expansion slots and sells for \$3995 with a 10-megabyte hard disk or \$4595 with 20 megabytes of hard-disk storage.

Other companies are sure to follow suit by introducing AT-compatible, 80286-based computers into a market that is already becoming crowded. Look for such machines from Tandy, Columbia, Ericsson, AT&T, and Mitsubishi (which manufactures the IBM PC-compatible Leading Edge and Sperry computers). Also, multiuser computer manufacturers such as Altos are expected to introduce machines that can run Xenix-based software compatible with the AT. In fact, so many firms are entering the AT-com-

patible market that one begins to wonder if the pie is large enough for all of them to share.

—MICHAEL J. MILLER



ALSO AMONG THE AT COMPATIBLES ARE NEW MACHINES FROM ZENITH, TELEVIDEO, AND NCR (CLOCKWISE FROM TOP).

Serious Spreadsheets for the Mac

Not too long ago, if you wanted a very powerful spreadsheet, you had to choose a program for the IBM PC or other MS-DOS computer, such as Lotus's 1-2-3, Supercalc 3, Framework, or Symphony. But thanks to some new software, Apple's Macintosh 512K is now challenging the IBM PC for the distinction of being the best machine for financial modeling. Lotus Development Corp.'s Jazz, Microsoft's Excel, and Paladin Software's Crunch (written by SofDesign) all offer serious alternatives for anyone who wants to create sophisticated spreadsheets.

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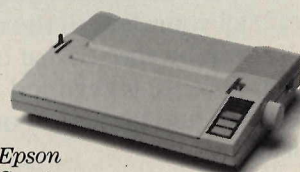
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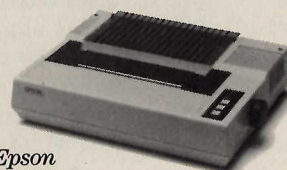
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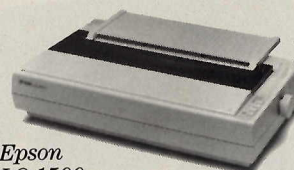
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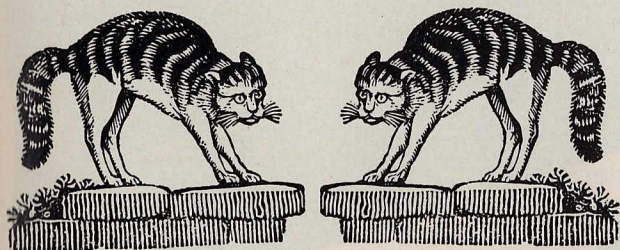


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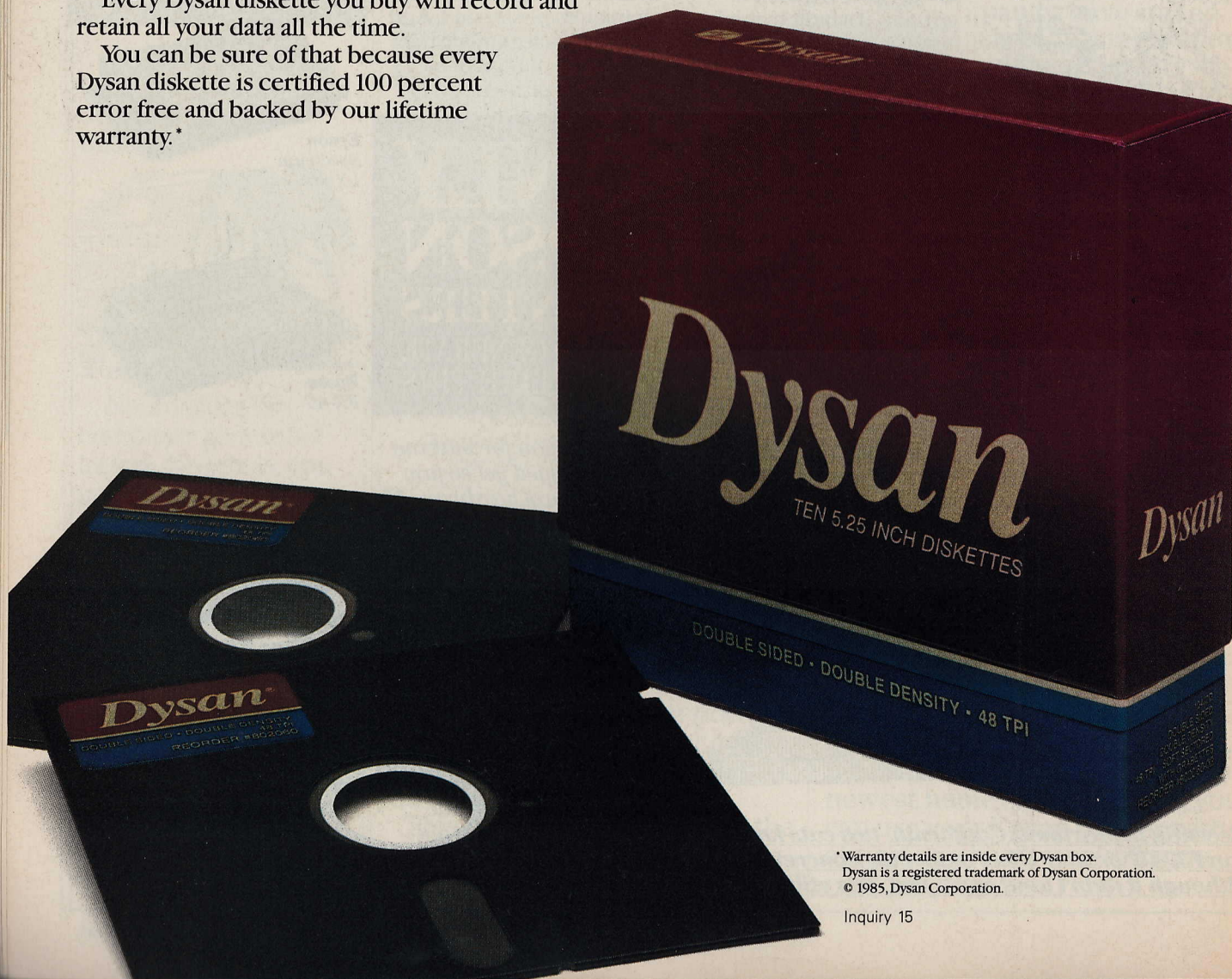
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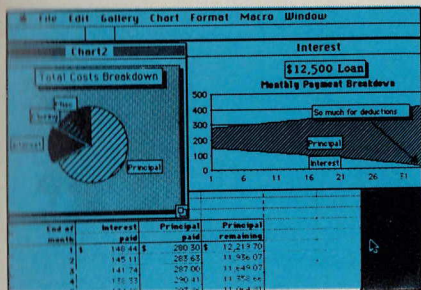


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Inquiry 15

RANDOM ACCESS

AUGUST 1985



EXCEL HAS IMMENSE SPREADSHEET POWER.

Combining full-fledged word-processing, spreadsheet, graphics, database, and communications capabilities, Lotus's Jazz, scheduled for release at the end of May, is far more comprehensive than its competitors. The \$595 program's most distinguishing feature is Hot View, which lets you link data from different applications, such as a spreadsheet and a graph. As you change the spreadsheet, the corresponding graph will change.

With Excel, scheduled for September release, Microsoft is trying a different tack, combining spreadsheet, graphics, and data management software to create a product aimed at serious spreadsheet users. As such, it is more like 1-2-3, whereas Jazz is more like Symphony. At \$395 Excel offers a macro language and perhaps the largest spreadsheet of any microcomputer program.

Like Excel, Paladin's \$295 Crunch (set for release in June) is aimed specifically at serious spreadsheet users who also want graphics and limited data management functions. Its most noticeable feature is a row of 21 small icons (located under the pull-down menus) that provide shortcuts to graphing, changing cell style, justifying text, recalculating, and so on—you just point the mouse and click.

Although finished versions of Jazz, Excel, and Crunch were not out at press time, a test of prerelease versions reveals interesting similarities and differences. All three programs have very large work areas, can graph data in a wide variety of formats, offer many built-in functions, support Apple's numeric keypad, and can use either the mouse or the keyboard for cursor control.

Jazz's worksheet offers 256 columns by 8192 rows, Crunch's is 250 columns by 9999 rows, and Excel's is 256 columns by 16,384 rows. But these differences don't mean much, because all three run into memory limits long before you can fill them to advertised capacity.

Both Jazz and Excel allow you to display multiple spreadsheets and their associated graphs at one time—Jazz can display a maximum of eight windows comprising any combination of its five functions. Crunch can display only one worksheet, though it can show up to six views of that worksheet along with notes, a directory of functions, and up to four graph windows. Limited only by available memory, Excel will display as many worksheets and as many views of a worksheet as you would like.

The three programs' formatting features vary as well. Both Crunch and Excel let you boldface, italicize, or underline a particular cell or range of cells, while the print style of a Jazz spreadsheet can be altered only as a whole. All three let you change the font of a complete worksheet but not of a particular cell.

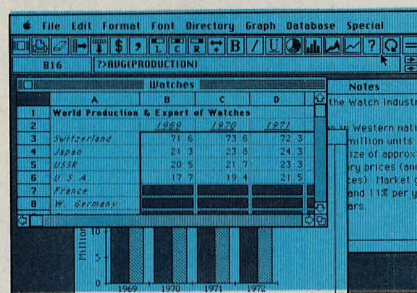
But the biggest difference among the three concerns programmability. Macro languages that automate repetitive functions are provided by most serious IBM PC spreadsheets, but of the Macintosh spreadsheets, only Excel includes a language for writing such routines. Excel can also automatically save a series of mouse movements and commands for later use. Both Excel and Crunch let you define and save functions to use later just as if they were built-in.

Crunch and Excel will each be able to run another application in memory through Apple's Switcher, though the 300K bytes or so that a fairly large spreadsheet occupies doesn't leave a lot of room for the other application. Indications are that Jazz will not work with Switcher, but its other applications answer much the same need.

As far as communicating with the IBM PC world goes, Excel can read and write 1-2-3 files, while Jazz can only read and convert files from 1-2-3, Symphony, and Multiplan's SYLK format. However, new re-

leases of Lotus's IBM products will be able to read Jazz files, solving many compatibility problems. The first version of Crunch will work only with its own files, though Paladin says future versions will also be able to read SYLK and ASCII text files. Crunch also has a notepad feature that lets you store up to 2½ pages of notes about a worksheet.

People who don't need the sophistication of these high-end spreadsheets may want to consider some less powerful—and less expensive—alternatives, such as Haba Systems' Quartet (\$195) and Microsoft's Mul-



CRUNCH'S ICONS MAKE FOR EASE OF USE.

tiplan (\$195). Also, this fall Microsoft plans to market Productivity Software's Mouseworks, a \$295 combination of word-processing, file management, and spreadsheet functions similar to those found in Appleworks for the Apple II family. Finally, for those who want just a small worksheet, T/Maker's \$80 ClickOn Worksheet offers a simple but effective 20-column by 50-row spreadsheet as a desk accessory.

Due in large part to the Mac's user interface, Jazz, Excel, and Crunch all seem easier to use than their counterparts on other machines. Also, the three products aim at slightly different markets: Jazz offers other functions in addition to spreadsheet models, Excel is perhaps the most sophisticated spreadsheet of the three, and Crunch is the easiest to learn and use (while still offering many sophisticated features).

All these are preliminary judgments, of course—we'll fully review the three products as soon as production versions are released. But one thing is clear—the Macintosh now deserves to be taken quite seriously as a spreadsheet machine.

—MICHAEL J. MILLER



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OBSERVATIONS

Lotus Grows...

Perhaps aiming for conglomerate status, Lotus Development Corp. has gone on a buying spree. Most visibly, the firm purchased Software Arts, the VisiCalc creator that introduced us to electronic spreadsheets. Ironically, Lotus founder Mitch Kapor once handled marketing for VisiCalc—now his firm can buy Software Arts with profits from 1-2-3, the program that replaced VisiCalc as the standard spreadsheet. Software Arts brings with it TK!Solver, a well-regarded but not terribly successful program that solves equations, and Spotlight, a memory-resident series of desk accessories. TK!Solver will be the first product marketed through Lotus's new Engineering and Scientific Products division. Software Arts founders and VisiCalc creators Daniel Bricklin and Robert Frankston will also be joining Lotus.

...and Grows

Lotus has also acquired Dataspeed Inc.—the producer of Modio and Quotrek, which receive stock quotations over FM sideband radio waves—and has licensed 3-2-1 Report Writer—for creating reports based on 1-2-3's database—from Concentric Data Systems (Lotus will market the program as 1-2-3 Report Writer). The firm announced Symphony Link, a product that provides 3278/79 emulation for Symphony, and is working with mainframe software supplier Cullinet to develop a method for linking Cullinet's mainframe software with Lotus's microcomputer products. On the home front, Lotus announced new versions of Symphony and 1-2-3 (respectively scheduled for summer and fall release). Both will use the Expanded Memory Specification (see "New PC Power from Lotus & Intel," page 21) and support the 8087 and 80287 arithmetic coprocessors. The new Symphony boasts a macro library manager and closer compatibility with 1-2-3, while the new 1-2-3 spreadsheet will include Symphony features. With all these announcements, Lotus seems intent on trying to establish itself as the IBM of the software industry. One possible problem: so is IBM.

Portable Choices

Morrow Computer and Zenith Data Systems have introduced the first battery-powered portable computers that have 80-column by 25-line displays, use 5¼-inch disk drives, and are designed to be compatible with all IBM PC software. Morrow's Pivot II displays quite readable text on a backlit LCD nonglare screen. A single-drive, AC-powered Pivot II with 256K bytes of RAM sells for \$1995, and a unit with dual drives, 640K bytes of RAM, a 1200-baud modem, graphics display, and a battery pack runs \$3795. Zenith chose a backlit aqua display for its version of the machine, called the Z-171. A 256K-byte dual-drive model (without the battery pack) sells for \$2699. At about 15 pounds each, these machines fit somewhere between transportable computers with "real" (CRT) displays and lighter portable machines that use smaller disks and less readable displays.

Continued on page 20—

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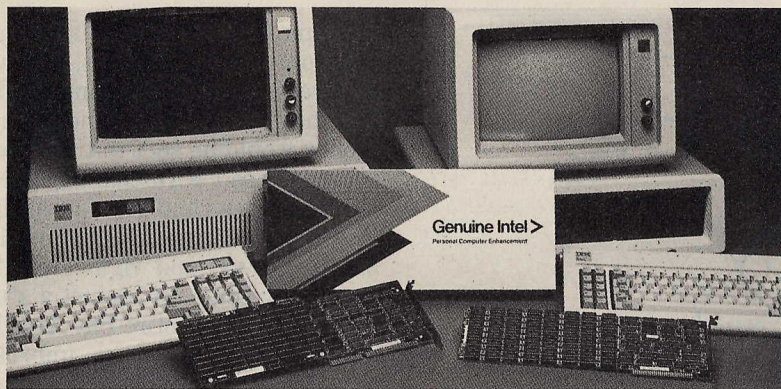
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New PC Power from Lotus & Intel

While 640K bytes of RAM still sounds like a lot of memory for most computer users, those who create large spreadsheet models or use RAM-based database programs have sometimes felt pinched by the IBM PC's 640K-byte memory limit. But now these users have a powerful solution, thanks to a new Expanded Memory Specification that allows programs for the IBM PC and compatible machines to store data in up to 8 megabytes of additional user memory.

The new specification was jointly announced in late April by Lotus Development Corp., whose 1-2-3 is the most popular IBM PC program, and Intel, designer and manufacturer of the 8088 central processor that is the heart of the IBM PC and similar machines. The memory enhancement will be most useful for programs that actively store a lot of information at one time, such as large spreadsheets or memory-based databases. However, the additional memory could also be used quite profitably as one or more large RAM disks—electronic emulations of floppy disks that are much faster than the real thing. The current specification is not designed to store multiple programs, but some ven-

dors will undoubtedly explore the potential for such a development.

Hoping to establish an industry standard, Lotus and Intel made the new spec public so that other hardware and software vendors can use it without charge. Many firms have said they will conform to the specification, though most computer manufacturers, including IBM, have yet to give anything but tacit support. The advance may help older 8088-based machines compete with IBM's PC AT and other new machines based on Intel's 80286 central processor (see "PC AT Clones Proliferate," page 11). One of the 80286's chief advantages is its ability to address more memory, even though this capability is not yet supported by MS-DOS, the standard operating system for the IBM PC and similar machines.

To get at the additional memory provided by the new specification, users will need special expansion boards and modified software. Existing programs will have to be changed to take advantage of the memory boost, and a number of vendors have said they will upgrade at least some of their products to access the extra memory.

For instance, Lotus plans to support the specification in both Symphony and 1-2-3. Ashton-Tate will adapt its Framework integrated package to take advantage of the extra memory, but the firm's dBASE III will not be changed because, being disk-based, it doesn't really need lots of RAM. Microsoft has said that its Windows environment will be able to use the extra memory (either in the initial or a near-future release); additionally, the firm is con-

sidering how this new potential will affect future versions of MS-DOS.

Even though programs and accessory boards written to the specification would make it possible for users to access up to 8 megabytes of memory, none of the currently announced software is designed to go quite that high. For instance, version 1.1 of Lotus's Symphony, scheduled for shipment this summer, will address up to 4 megabytes.

When it announced its Expanded Memory Specification, Intel also entered the add-on memory board market with a pair of products: Above Board/PC and Above Board/AT. The PC product, designed for the IBM PC and compatibles, allows for 2 megabytes of storage on each fully loaded board, so with 4 boards you could reach the maximum 8 megabytes of storage. The AT version, which works on the IBM PC AT and compatibles, supports up to 4 megabytes per board and can also be used as a RAM disk and/or print buffer. Above Board/PC lists for \$395 with 64K bytes of memory installed and \$595 with 256K bytes. The AT version costs \$595 (128K bytes) or \$995 (512K bytes).

Other manufacturers of memory boards will be getting in to the act as well—most say they were working on their products before the Lotus/Intel announcement. Quadram says its Liberty board was originally designed to use a slightly different paging scheme but will be compatible with all software written to the specification. According to AST, its RAMpage board will work with all software that follows the current specification but will have built-in flexibility to accommodate changes in the operating system. Persyst has announced that its Beyond board will support the Lotus/Intel specification, and a similar product is expected from Tecmar.

It's interesting to note how far the computer industry has come. Just four years ago, when IBM introduced the IBM PC, most machines had a maximum memory of 64K bytes. Now we've reached the point where 10 times as much is not enough. —MICHAEL J. MILLER

INDUSTRY

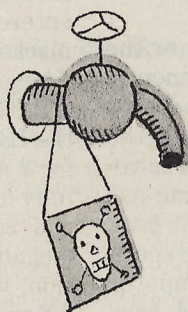
Poison in the Valley

Silicon Valley sprouts few smokestacks, but pollution's a problem all the same

Since the arrival of the Spanish explorers, the view of northern California's Santa Clara Valley as a verdant paradise has often been voiced but seldom exaggerated. During the '30s, farmers escaping the Dust Bowl referred to the lush vale as the Valley of Heart's Delight. Even through the 1960s, small towns with pastoral names like Mountain View, Sunnyvale, Menlo Park, and Palo Alto snuggled like pearls on the necklace of the San Francisco Peninsula. They were separated by working farms, orchards, and hothouses that were irrigated through the rainless summers by hundreds of wells and massaged by cooling evening breezes from the ocean. But as high-tech manufacturing replaced greener crops in the region now dubbed Silicon Valley, poison entered the paradise.

When the personal computer explosion was sparked in the valley in the mid '70s, few eyebrows were raised. After all, what better way to assuage the drought of those years than with the clean, low-profile semiconductor industry? Fairchild, Hewlett-Packard, Lockheed, IBM, and others brought quiet prosperity to the wonderfully temperate region.

But the speed with which Silicon Valley grew was unprecedented. Before you could say semiconductor, everything had seemingly gone berserk. New houses with astronomical prices replaced the orchards, highways choked on new traffic, the once-quiet towns merged into an unbroken tract, and the electronics industry turned out to be an environ-



mental wolf in sheep's clothing.

The fallacy of electronics as a benign enterprise was first revealed in 1981, when it was reported that toxic solvents used in the manufacture of semiconductors had leaked into Santa Clara County's water supply. Both public

and private wells were tainted by 1,1,1 trichloroethane (TCA), an organic solvent used to clean grease off silicon-based circuitry. The proximity of the polluted water supplies to IBM and Fairchild manufacturing facilities implicated both companies, and both of them not only have admitted that a problem exists but also have gone to considerable lengths in cooperating with regional water control officials on research and cleanup efforts.

But the public did not become fully aware of the extent of the problem until late last year, when the EPA released a list of approximately 200 of the most dangerous toxic waste sites in the country. Nineteen of the sites were in Silicon Valley, a statistic that gave Santa Clara County the unhappy distinction of having more deadly dumps than any other county in the country.

Ted Smith, chairman of the Silicon Valley Toxics Coalition, was not surprised by the valley's place on the list. In fact, he claimed that there were some 120 known toxic sites in the area. "People are entitled to know that there are serious contamination sites near their neighborhoods," he said, adding that it was "absolutely unconscionable" that the EPA had delayed as long as it did in releasing its list.

Despite Silicon Valley's unenviable position on the EPA's list, however, it became clear at the end of 1984 that no federal Superfund cleanup money would be sent to the valley's rescue. Faced with this news, concerned citizens and activists such as Smith began to tackle the problem on their own, and right from the start they came up against a stumbling block. The entire Bay Area has become essentially one unbroken metropolitan unit, but each municipality still has its own laws governing the lands and waters within its jurisdiction. This patchwork of legislation thwarted initial efforts at valley-wide progress.

At year's end, a poll of local newspaper reporters found that toxic contamination was the top Silicon Valley news story of 1984. Dr. Edward Ginzton of the Stanford Mid-Peninsula Urban Coalition warned industry leaders and workers that if they thought Silicon Valley was a place of abundance, they weren't looking closely enough. George Treichel, a professor of environment at San Francisco State University, cautioned that the valley's growth could easily turn it into another Los Angeles (Treichel also suggested with tongue in cheek that another earthquake on the order of the 1906 upheaval would do wonders for the future of the valley by deterring the influx of newcomers).

As 1985 began, the efforts of concerned citizens and environmental activists were still making little headway. When California issued its own Superfund list on January 12, none of the Silicon Valley sites were among the 10 slated for complete cleanup with the \$100 million in funds allocated in a statewide referendum.

Three days later, the results of two state-commissioned studies of the Los Paseos neighborhood—located in south San Jose near an identified TCA leak—were published. The studies found that between January 1, 1980 and December 31, 1981 expectant mothers in Los Paseos had 2.4 times as many miscarriages as those only three miles away. Moreover, Los Paseos babies born during that period had three times the num-

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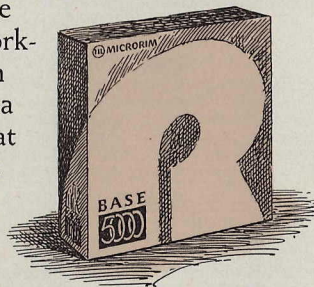
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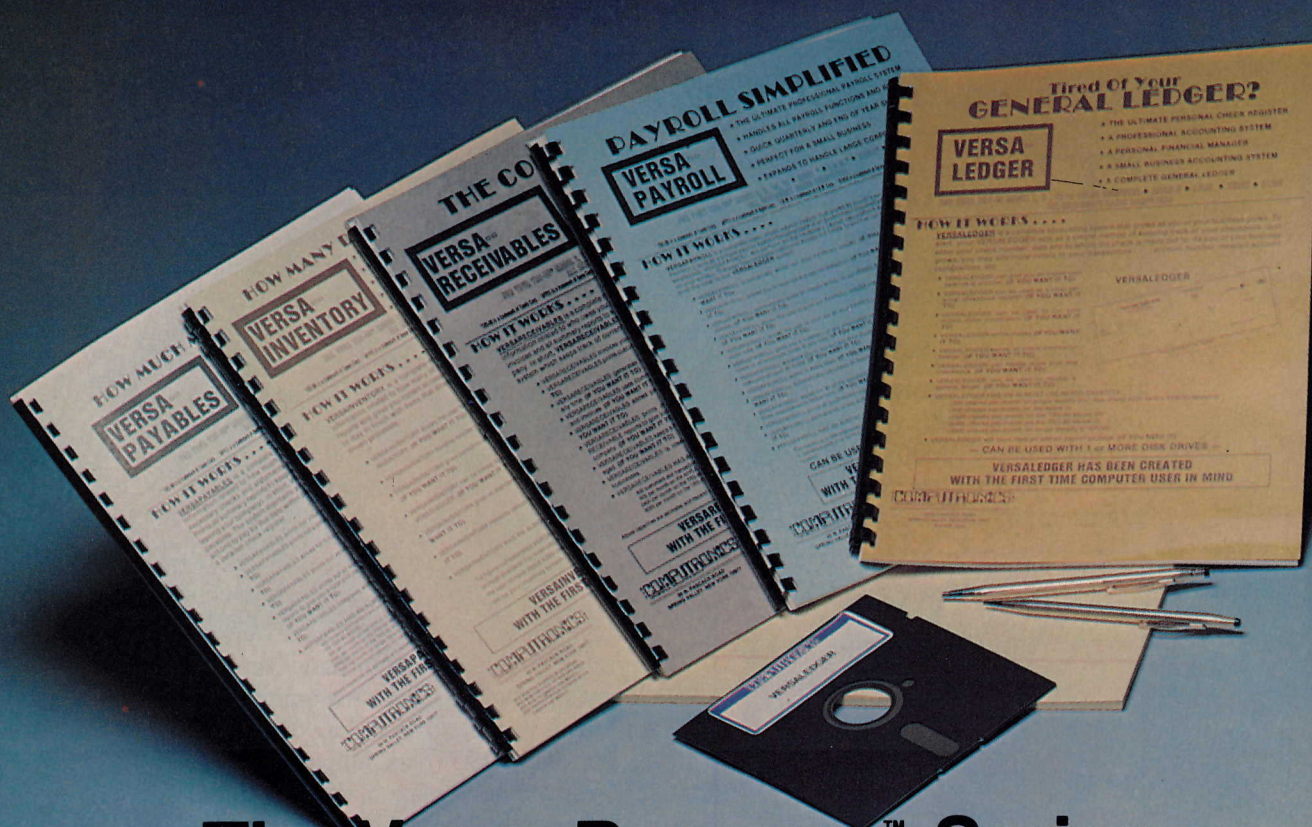


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ber of birth defects in general and 2.5 times as many heart defects.

Los Paseos residents have filed over 400 lawsuits against Fairchild, who they claim is responsible for the pollution of their water. But in fact the studies do not provide conclusive evidence that the birth defects are directly related to the TCA—a number of sources may have contributed to the problem. Governor Deukmejian has earmarked \$825,000 in the 1985-86 state budget for continued study of the situation.

There is a bright spot in the future of Silicon Valley's water supply. The very industry charged with the toxic leaks has cooperated with local officials to a remarkable degree. Rather than creating the sort of adversarial relationship that has characterized industrial pollution in decades past, companies such as IBM and Fairchild immediately alerted local water-quality officials when they discovered leaks at their plants and have since poured millions of their own dollars into cleanup efforts.

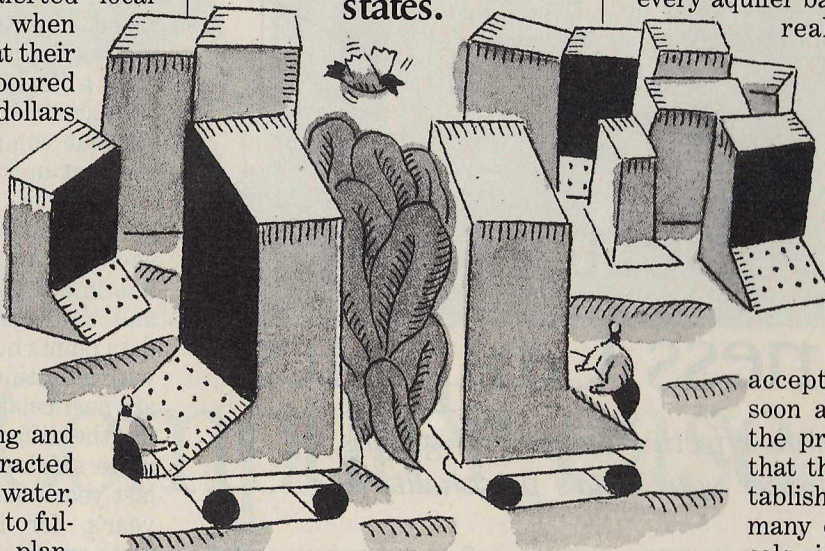
IBM, for instance, has already spent over \$35 million on cleaning up tainted groundwater, and the company expects that figure to reach \$45 million by the end of this year. The firm has drilled over 300 testing and monitoring wells, extracted and purified affected water, and otherwise worked to fulfill its own cleanup plan, which has been approved by the regional water-quality control board.

Similarly, Fairchild has invested over \$16 million in extracting, aerating, and filtering water polluted with the TCA that leaked from its storage tank in 1981. According to Fairchild's Francine Plaza, the firm is not looking for federal or state funds to support its cleanup, feeling instead that it is entirely appropriate for the company to set things right on its own.

Fairchild, IBM, and most other Silicon Valley electronics manufacturers have banded together to form the Clean Water Task Force, an in-

dustry group organized to pool technical information and promote communications. As Fairchild's Plaza puts it, "In addition to being Fairchild employees, we live here," suggesting that members of the industry are as concerned as anyone else about making the region a safer, cleaner place to live.

CALIFORNIA
is just the tip of
the iceberg—similar
toxic contamination
surrounds high-tech
manufacturing plants
in several other
states.



The search for solutions has begun to turn up some rather sophisticated possibilities. Several teams of researchers are experimenting with strains of bacteria that "eat" the organic solvents so deadly to humans. Introduced into contaminated groundwater, the bacteria could provide an automatic cleanup—the only danger is that what they leave behind might be worse than the toxins they attack. Also, a computer model is being developed by the U.S. Geological Survey in Menlo Park to simulate the flow of underground water. Such simulations may make it easier to pinpoint

problem areas and thus help cleanup crews do their jobs more efficiently.

Of course, optimism on this score presupposes continued support of cleanup efforts, and the latest developments in the region are encouraging. The Safe Water Council—a united group that has the support of the Silicon Valley Toxics Coalition as well as other environmental groups, local politicians, and all major industries in the region—has recently proposed a comprehensive eight-point program that would address the situation on several levels. State funding for the program seems likely, and the industries supporting the proposal have pledged private financing to match whatever amount the state allocates.

While the eight-point plan emphasizes the cleanup of tainted groundwater, it also concedes that bringing every aquifer back to normal is not realistic. For those

cases where a water supply has been polluted beyond immediate recovery, the plan proposes extensive research into methods of treating the water to bring it into line with

accepted standards as soon as possible. Part of the problem, however, is that the EPA has not established standards for many of the toxic chemicals in Silicon Valley's water, and another facet of

the Safe Water Council's program specifies that standards for permissible levels be established.

So while some progress is finally being made, the problems of polluted water supplies in Silicon Valley are severe. And the situation in California is just the tip of the iceberg. There are already indications of contamination in groundwater near semiconductor-manufacturing facilities in Massachusetts, Arizona, and Vermont. But we can hope that the recognition, research, and cooperation now going on in Silicon Valley will generate workable solutions before other parts of the country find

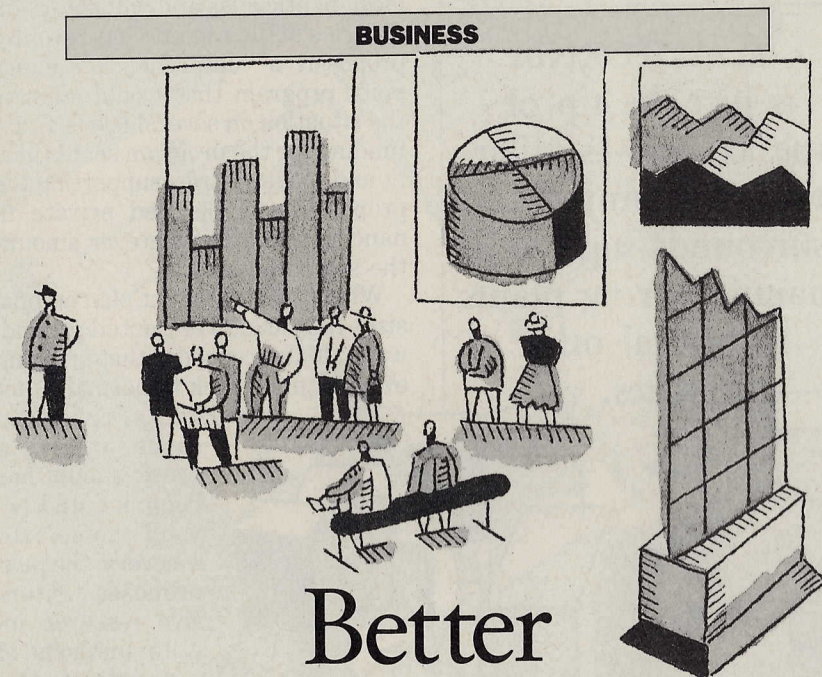
themselves in the same dire straits.

All this suggests that there's still a lot we don't know about the perils of high tech, but at least we are no longer operating under the delusion that electronics manufacturers are somehow in a class apart from industries whose adverse environmental impact has already been widely

documented. Computers and other electronic marvels promise to improve the quality of our lives, but we must make sure that we do not destroy where we live in pursuit of that promise.

—RICHARD BENYO

Richard Benyo, a Mountain View, California, freelancer, also wrote "The Image Sweepstakes," which appeared in the April 1985 *Popular Computing*.



Better Business Graphics

*For more effective charts and graphs,
consider your data's personality*

The Information Age is upon us, and with it has come an explosion of charts and graphs that put numerical data in a readily accessible form. Whether it's in the board room, on the nightly network news, in the business section of the newspaper, or on the screens of personal computers, graphics are an increasingly important means of presenting information.

But creating effective graphs and charts with a personal computer involves more than just translating numbers into images. We've all seen charts that simply don't work—they fail to convey any real sense of the information they're supposed to represent. Ironically, today's business

graphics software may have contributed to the proliferation of ineffective graphics precisely because it is sometimes too easy to use, making mindless activity out of what should be a thoughtful process.

The key to creating an effective chart or graph is recognizing that your data has a *personality*—it might be encouraging or disappointing, detailed or simple, consistent across time or variable, noteworthy or routine, and so forth. By recognizing your data's personality and using it as a guide, you'll be able to make better decisions about the appropriate type of chart or graph, the use of color, the scale of the image, text for labels and titles, and other fine

points that separate truly effective graphics from jumbled, confusing displays.

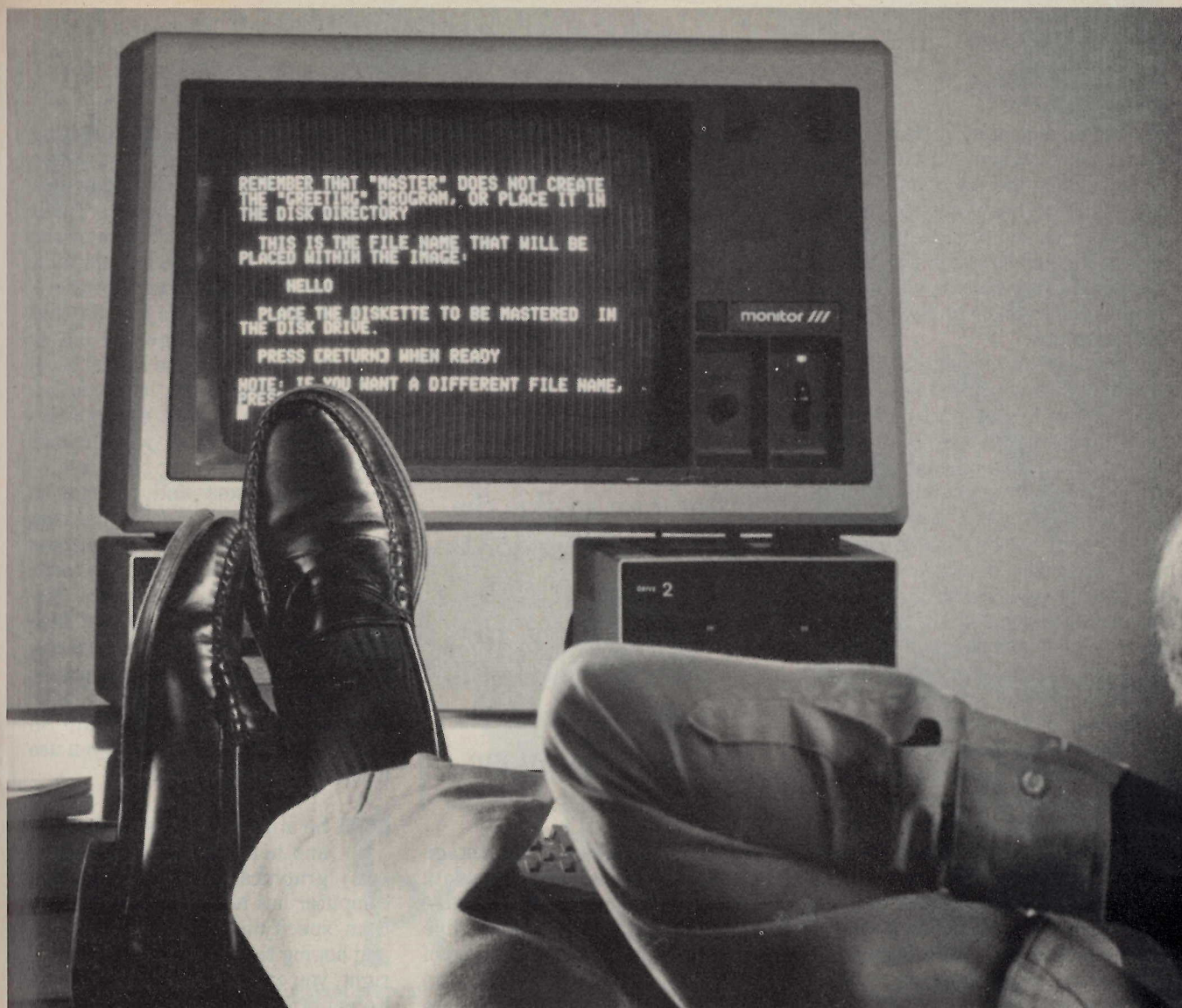
Your first decision about how to represent your data concerns the basic graph or chart type, and the most important factors in this choice are the volume and type of data to be presented. A cluttered graph—probably the most common pitfall—can ruin the effect you want to create. Let's quickly review the basic graph types and look at the sorts of data they best suit.

The familiar line graph, in which a continuous line connects a series of data points, is most often used to represent values that change with time. For data that shows a steady positive trend across time, the line graph is an excellent choice—it yields an upward curve, the classic image of productivity. When diminishing values represent a positive trend (a drop in customer complaints, for instance), you might consider a different way of representing the facts (such as number of days without complaints) so that you'll get that upward curve.

Variations on the standard line graph include area graphs, which show the area below each graphed line in a different pattern or color, and scatter plots, which indicate data points but do not connect them with a continuous line. Area graphs are particularly useful for highlighting the differences between two or more similarly shaped line plots—last year's sales figures versus this year's, for instance—and scatter plots are the best choice when you want to incorporate a large number of discrete points on the same graph, as in high-low-close charts of stock prices.

The line graph, then, is a good choice if you want to represent trends across time. But if you want to *compare* analogous data—such as sales figures by region—it's time to call on the bar chart, in which horizontal or vertical bars represent data values. Parallel bars indicating sales for every region reveal comparative differences at a glance.

Stacked-bar charts are useful for data that is too multifaceted for simple bar charts, because individual bars may be broken down into com-



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ponents represented by contrasting colors or patterns. Stacked-bar charts should be used only when your audience has plenty of time to pore over them, though—they are generally read first for the values presented in the bars as wholes and then for the breakdown indicated by the segments.

A stacked-bar chart would be a good choice for a printed report that makes a graphic comparison of company budgets for the past eight years and also gives the percentages of each annual budget allocated to various departments. You can combine all your data in a single image by stacking the departmental percentages for each year in a single bar representing the total annual budget. Another advantage of stacked-bar charts is that you can diminish the visual effect of unfortunate data by "hiding" it at the bottom of a bar.

Pie charts are the third main type of graphic image generally available to users of today's personal computer graphics software. These round charts with their wedge-shaped segments are pretty well limited to showing the parts (usually percentages) that make up a whole. The "exploded-pie" chart highlights one or more of these parts by pulling them out from the pie. Use exploded pies sparingly lest you lose the dramatic effect they are intended to provide.

Choosing the appropriate type of graph or chart is relatively straightforward in that the volume and type of data provide objective criteria—all you have to do is give the matter a bit of thought. Beyond this choice, however, lie more subtle considerations. This is where the personality of your data, as well as the needs, expertise, and predispositions of your audience, must be carefully considered.

Labels, legends, and titles warrant special care. You have very little space to work with here, so these identifiers must be absolutely to the point. Consider the sophistication of your audience—will they understand the abbreviations or jargon you'll be tempted to use? Also, make sure the textual elements of a graph or chart complement the visual effect. That

exploded-pie wedge should have a label that stands out from other text—experiment with larger type or a different color or font, for instance. As a general rule, though, strive for consistency in headings and labels throughout a graphic presentation.

We use graphics because they tend to make collections of data easy to

BECAUSE
color can make the
drabest data look
spectacular, it's
often thrown in
without careful
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understand, but this very advantage can be a drawback when your data is bad news. One dip or negative value won't be too alarming in a line graph, especially if a number of positive values make it look like an isolated instance. But when data contains more than one or two negative values, it may be smarter to use a stacked-bar chart, in which less positive aspects can be made a part of a larger, more positive whole. If you must include negative data in a line graph, be sure that the horizontal base line is lower than your lowest graphed point—otherwise you'll make a bad situation worse by having the negative value appear to fall off the graph. By their very nature, pie charts cannot accept negative values.

Data of the unfortunate variety often looks better when you reverse the axes of the graph or chart. Line graphs that fall away to the right rather than downward don't look quite so alarming, and distressingly short bars in a bar chart don't stand out as much if they're horizontal rather than vertical.

Similarly, altering the scale of a graph (the data-value units represented by tick marks on the axes)

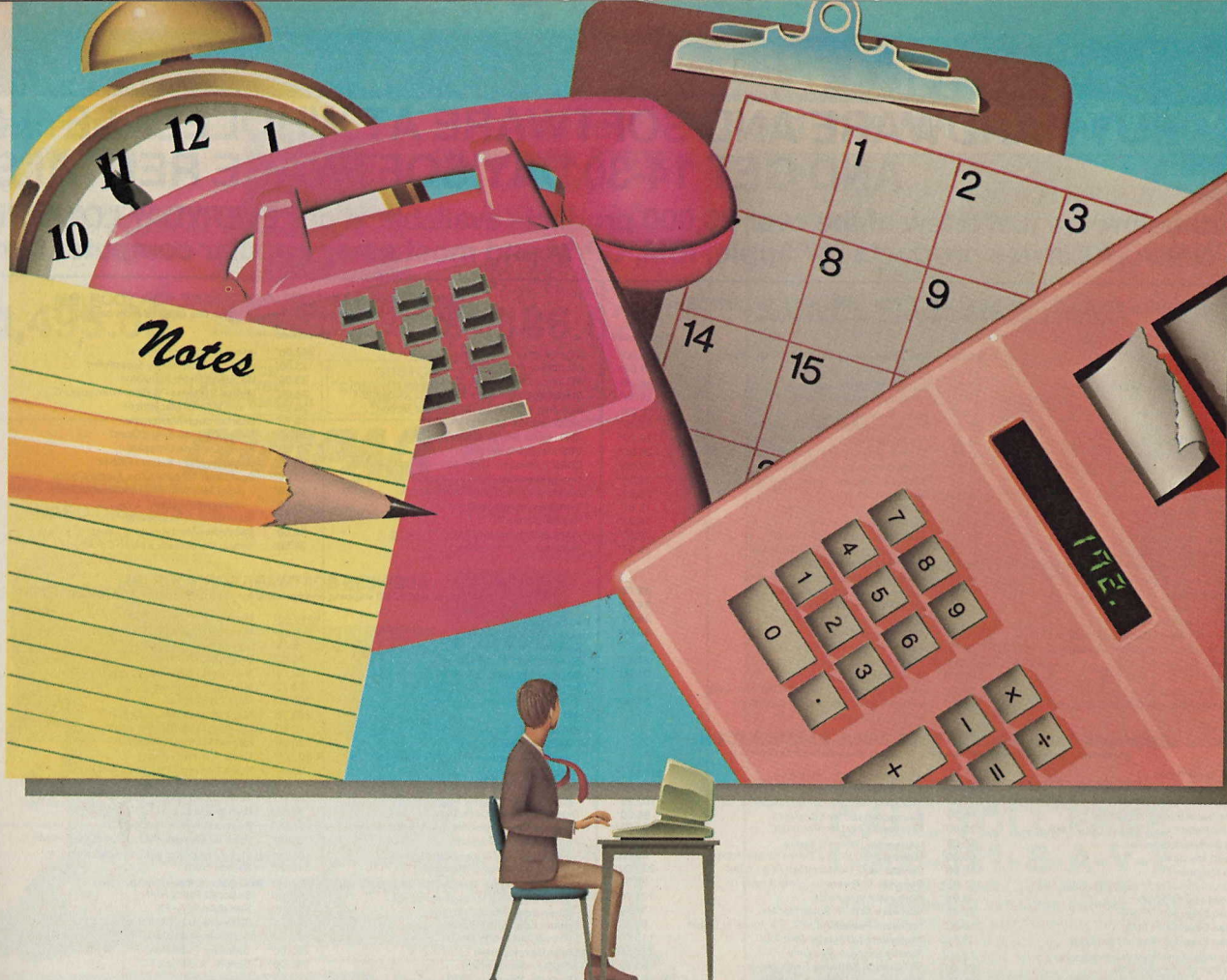
can soften the blow of disappointing data. If sales have dropped every month for the last two quarters, choose a scale that makes these drops look like short downward steps rather than precipitous falls. The reverse is also true, of course—to highlight gains, use a scale that makes the jumps bigger. In either case, you may want the lowest level to be something other than zero; beginning with a "lowest common denominator" will give you greater flexibility in adjusting the scale.

Reversing axes and altering a graph's scale are two techniques that you have more time to pursue thanks to powerful graphics software for personal computers. Remember that it is this sort of flexibility that has earned computers a place in almost every business—don't squander it by treating your machine as nothing more than an automatic graphing tool that you use without thinking about it.

The appropriate use of color is another aspect of creating graphics that the personal computer has revolutionized. Rather than specifying colors in advance and hoping they come out looking all right, you can try different combinations until you're satisfied with the end result. But there are a few general guidelines regarding color that will help to ensure a pleasing and effective image.

Overuse is the most common mistake regarding color in graphs and charts. Because color can make the drabest data look spectacular, it's often thrown in without careful consideration of the goal of the image. Just remember that you're not after oohs and aahs—you're trying to convey numbers or statistics. If the data elicits an excited response, then the graph that presents it should be dazzling. But if the data is routine, there's really no reason to jazz it up with gratuitous color.

Also, think about the effect of the colors you choose. Red, even though it highlights whatever it is applied to, can also connote negatives such as debt and danger. (Moreover, the surprisingly large percentage of males who have some color blindness will see red as a muddy brown.)



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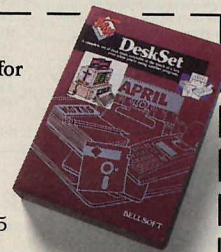
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Hayden Sargon III	27.00*	Spinnaker The Most Amazing Thing	20.77*
Infocom Deadline or Suspended	20.50*	Spinnaker Delta Drawing	24.97*
Infocom Enchanter, Planetfall		TMaker Click Art-Mac Only	29.97*
Cuthroats, Witness or Zork I		Warner Desk Organizer	65.00*
Infocom Hitchhiker's Guide or Seastalker	22.00*	Videx Fun Pack-Mac Only	19.77*
Infocom Suspender, Sorcerer or Infidel	25.00*	Videx Mac Checkers & Reversal	25.17*
Infocom Zork II or III	23.50*	Videx Mac Vegas-Mac Only	31.00*
Layered Front Desk-Mac Only	65.00*	Videx Mac Gammon & Cnbbage-Mac Only	25.17*
Mirage Concepts Trivia	24.00*	Virtual Combinatics Micro Cookbook	21.00*
Mark of the Unicorn Mouse Stampede	19.00*		

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Apple Apple Works	\$179.97*	Microsoft Word for Macintosh	\$102.25*
Borland International Turbo Pascal	30.00*	Microsoft File for Macintosh	\$102.25*
BPI GL, AR, AR, PR, or IN	21.50*	Microsoft Multitask for Macintosh	\$102.25*
Broderbund Bank Street Writer	40.00*	Microsoft Basic for Macintosh	85.00*
Central Point Copy II Plus or Copy II Mac	20.00*	Microsoft Chart for Macintosh	66.25*
Funk Software Sideways	35.00*	Monogram Dollars & Sense	52.00*
Funksoft Macasm	60.00*	Monogram Dollars & Sense for Macintosh	89.98*
Haba Habadad	40.00*	Odesta Helix for Macintosh Reg's 512K	67.50*
Haba Quartet Jazz Features Available Now!	101.95*	Sensible Software Sensible Speller IV	125.00*
Harvard Mac Manager	29.95*	Softcraft Fancy Fonts	134.00*
Human Edge Mail Prober	25.50*	Software Arts TK Solver for Mac	134.00*
Human Edge Sales Edge	110.00*	Software Publishing PFS: File, Write, or Graph	68.00*
Human Edge Communication Edge	98.00*	Stoneware DB Master-Mac Tool	115.00*
Living Videotext Think-Mac Tool	75.00*	Provue Overview-Mac Only	135.00*
Main Street File-Mac Only	85.00*	Rio Grande Software Softmaker II	85.00*
MECA Managing your Money	105.50*	Telos Flevision for Mac	87.50*

HARDWARE FOR YOUR APPLE II & MACINTOSH

(Please add shipping and handling charges found in italics next to price.)

DISK DRIVES

	Wholesale		Wholesale
Alps AP-100A Dual Apple Drives in One Case	\$309.00* (7.00)	Hayes Micromodem II w/Smartcom	\$125.00* (2.50)
Alps AP-100C Slimline Drive in Case	159.00* (7.00)	Novation Apple Cat II	174.45* (3.50)
Apple MAC 4000K External Drive	349.95* (7.50)	Prometheus 1200 A	276.00* (6.00)
Haba 800KB Double Sided Drive	315.00*	Low Cost 1200 Baud Internal Modem for Apple II	
Twice the Capacity Reads Standard Disks!		Prentice Pro Com Mac Pack	322.00* (2.50)
Micro Set A2 143KB Drive	165.00* (5.00)	1200 Baud Modem, Cable, Straighttalk	
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Micro Set Floppy Controller	55.00* (2.50)		
PC Network 140K External Drive for Apple IIc	115.00* (2.50)		
Rana Elite I 163K Drive	225.00* (5.00)		
Rana Elite II 326K Drive	320.00* (7.00)		
Rana Elite III 652K Drive	398.99* (10.00)		
Tecmar 5MB Removable Drive for MAC	1,350.00* (29.16)		
Tecmar 10MB MAC Drive	1,250.00* (29.16)		
Tecmar 5MB MAC Drive Upgrade	1,295.00* (27.97)		

BOARDS AND BUFFERS

	Wholesale		Wholesale
ALS Z-Engine	\$129.00* (2.50)	Hayes Micromodem II w/Smartcom	\$125.00* (2.50)
AST Multi 1/0-2 serial/Clock	155.00* (2.50)	Novation Apple Cat II	174.45* (3.50)
Microsoft Premium Softcard Ite	243.67* (2.50)	Prometheus 1200 A	276.00* (6.00)
Microtek Duxing GX	55.00* (2.50)	Low Cost 1200 Baud Internal Modem for Apple II	
Orange Micro Grappler +	96.90* (2.50)	Prentice Pro Com Mac Pack	322.00* (2.50)
Orange Micro Serial Grappler	78.00* (2.50)	1200 Baud Modem, Cable, Straighttalk	
PC Network 280 Card	35.00* (2.50)		
Quadram APIC/G Graphics Interface	62.00* (2.50)		
Quadram RAM-80	88.00* (2.50)		
Quadram Multicore-1 Parallel/1 Serial/1 Clock/Expandable to 256K	140.00* (2.50)		
Thunderware Thunderclock	104.00* (2.50)		

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(All Memory Chips Guaranteed for Life!)

	Wholesale		Wholesale
64K Memory Upgrade Kits (9 Chips)	\$7.20* (1.00)	Amdex Video 300G Composite Green	\$110.00* (3.00)
Quantity Discounts Available!		Amdex Video 300A Composite Amber	120.00* (3.00)
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256K Dynamic Ram Chips (Each)	4.35* (1.00)	Amdex Color 300-Composite	130.00* (4.64)
128K IBM AT Piggyback Chips (Each)	7.50* (1.00)	Amdex Color 500-High Res RGB	365.00* (7.88)
		Amdex Color 700-Ultra High Res	455.00* (9.83)
		Amdex Color 710-700 w/Non Glare	475.99* (10.48)

EXTERNAL MODEMS

	Wholesale		Wholesale
Anchor Mark XII	\$230.00* (5.00)	Princeton HX-12 RGB Monitor	CALL
Hayes Smartmodem 300	125.00* (5.00)	Princeton MAX-12e RGB/Mono	CALL
Hayes Smartmodem 1200	355.00* (5.00)	Quadram Quadchrome II New!	370.00* (8.21)
Hayes Smartmodem 2400	568.00* (5.00)	640X200 RGB w/14" Screen!	
Prometheus Promodem 1200	279.00* (6.00)	Black, Phosphor Mask/IBM Case	
External 100% Hayes Compatible		Samsung 12" TTL IBM Type Amber	89.50* (5.00)
U.S. Robotics Courier 2400BPS Modem	525.00* (5.00)	A great looking/performing monochrome from the	
U.S. Robotics Passport	195.00* (4.00)	manufacturer of IBM's own color monitor	
LOWEST PRICE 1200BPS Modem!		Zenith ZVM-123 Green High Res	76.00* (2.50)
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	Wholesale		Wholesale
ATI How to use Multimate	\$42.00*	Infocom Zork I or Witness	\$20.50*
ATI Intro to PC DOS Vol. I & II	23.00*	Infocom Deadline, or Suspended	27.00*
ATI Intro to BASIC	23.00*	Microsoft Flight Simulator	27.00*
Bluebush Chess (Your Toughest Opponent)	34.00*	Mouse Systems PC Paint—Turn your PC	59.95*
Bluechip Millionaire/Oil Baron or Tycoon	28.25*	into A Color Macintosh!	
Broderbund Lode Runner	19.75*	Scarborough Masttype	27.00*
CBS Green Bridge Made Easy	45.00*	Sierra On-Line King's Quest	27.00*
CBS Mastering the SAT	81.00*	Sierra On-Line Crossfire	18.00*
CDEX Training for Word Star	37.25*	Sublogic Night Mission Pinball	20.00*
Comprehensive Intro to Personal Computing	32.00*	Spinnaker Alphabet Zoo, Kinder Comp.	15.97*
Davidson Math Blaster, Word Attack!	26.50*	Story Machine, Face Maker, Hey Diddle, Diddle,	
Davidson Speed Reader II	36.50*	Rhymes & Riddles	
Hayden Sargon III	26.97*	Spinnaker Delta Drawing	24.97*
Individual Professor DOS	32.50*	Spinnaker Most Amazing Thing	20.77*
Individual The Instructor	24.50*	Virtual Combinatics Micro Cookbook	21.00*

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Ashton-Tate Framework	310.00*	MicroRim Clout	110.00*
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Borland Side Kick (Protected)	26.00*	Microsoft C Compiler	275.00*
Borland Turbo Pascal 8087	49.75*	Microsoft Word—Latest Version 2.0	205.00*
Borland Superkey	235.00*	Microsoft Multiplan	105.00*
BPI GL, AP or AR	265.00*	Microsoft Mouse	107.00*
BPI Aura	48.00*	Monogram Dollars & Sense	102.00*
BPI Personal Accounting	20.00*	Multimate (Latest Version)	200.00*
Central Point Copy II PC	157.00*	Norton Norton Utilities 3.0	46.00*
Conceptual Instruments Desk Organizer	33.00*	Oasis The Word Plus	90.00*
Digital Research CP/M-86	57.00*	Open Systems P/O Sales A/R INV G/L A/P	325.00*
Digital Research DR Logo	28.00*	Team Mgr	222.00*
Digital Research Gem Desktop	73.00*	Power Base Power Base	345.00*
Digital Research Gem Draw	235.00*	Real World G/L A/R P/O OE/INV	74.00*
Enertronics Energraphics with Plotter Option	34.00*	Resort Prokey Version 3	570.00*
Funk Software Sideways	185.00*	Ryan McFarland RM COBOL (Dev System)	227.00*
Harvard Harvard Project Manager	240.00*	Sanna Sanna II Word Processor	320.00*
Harvard Total Project Manager	68.00*	Satellite Software Word Perfect	195.00*
Hayes Smartcom II—New XT/100 Emulator	137.50*	Softcraft Fancy Fonts	125.00*
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Human Edge The Sales Edge	137.50*	Software Arts TK Solver	22.00*
Human Edge Mind Prober	26.75*	Software Publishing PFS: File, Write, Graph	72.00*
Lifetree Volkswriter Deluxe	135.00*	Software Publishing PFS: Report	64.00*
Lotus Development Lotus 1-2-3	265.00*	Sorcim Supercalc III	159.00*
MDBS Knowledgebase	245.00*	Xanaro Ability	252.00*
Micro Pro Wordstar 2000	222.00*		

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Apparat 512K Memory Board with 64K	\$132.00* (2.85)	Hayes Smartmodem 1200B with New	\$317.00* (2.50)
Imogene Bernoulli Box Dual	2,275.00* (49.14)	Smartcom II/VT100 Emulator	225.00* (2.50)
16MB Drives		Prometheus Promodem 1200B	225.00* (2.50)
Maynard WS-1 10MB Internal Hard Disk	730.00* (15.77)	Internal Modem	
Maynard WS-2 same as WS-1 but with	930.00* (20.30)	AST Reach! Short Slot 1200 Baud	345.00* (2.50)
Sandstar Floppy Controller (uses 1 slot)		Internal Modem	
PC Network 10MB INTERNAL Height	419.00* (9.06)	Quadram Quadchrome II 1200 Baud	275.00* (2.50)
Autoboot Drive, New lower price		Half Card w/Crosslink XVI	
Drives by Shugart or Tandon			
PC Network 10MB Internal Tape Backup	475.00* (10.26)		
Same unit used in Compag's DeskPro!			
PC Network Half Height Drives	77.50* (1.67)		
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Tandon TM 100-2 Full Height HDD Drives	93.00* (2.20)		
Tallgrass 25MB External Hard Disk	2,375.00* (51.30)		
with 60MB Tape Backup			
Tecrad FS-55-B Half Height DSD Drives	90.00* (1.94)		
Tecrad 1.2MB Half Height Disk Drive for AT	110.00* (2.40)		

MULTIFUNCTION CARDS

	Wholesale		Wholesale
Apparat 256K Memory Board with 64K	\$81.00* (1.75)	Hayes Smartmodem 1200B with New	\$317.00* (2.50)
AST Six Pack Plus With 64K	222.00* (2.50)	Smartcom II/VT100 Emulator	225.00* (2.50)
AST I/O Plus II	120.00* (2.50)	Prometheus Promodem 1200B	225.00* (2.50)
AST Advantage for AT	375.00* (2.50)	Internal Modem	
Everest Magic Card/64K	160.00* (2.50)	AST Reach! Short Slot 1200 Baud	345.00* (2.50)
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Included Extra Software		Quadram Quadchrome II 1200 Baud	275.00* (2.50)
ORCHID Blossom w/64K	200.00* (2.50)	Half Card w/Crosslink XVI	
Quadram Improved Quadboard w/OK	170.00* (2.50)		
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Persyst Bob Card Ultra Hires Color	365.00* (2.50)		
Card with Mono Quality Text in Color			
STB Graphics Plus II	235.00* (2.50)		
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Brand Name DBDD Disks	\$14.00* (1.00)		
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Koala Speed Key System	101.00* (2.50)		
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SMA PC Document—Keyboard Templates	9.99* (1.00)		
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COMPLETE SYSTEMS

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AT&T 7300 Unix PC	\$3,699.00* (79.90)	IBM PC Base System 2DSDD/FDC/256K	1,495.00* (32.00)
10MB Hard Disk 1 Floppy/512K		IBM PC Professional Hard Disk	1,886.82* (40.00)
COMPAQ Hard Disk Portable	2,285.00* (49.35)	IBM PC/AT All Contigs	CALL
10MB Hard Disk/Floppy/256K		Sanyo MBC 550—Lowest Cost Compatible	\$620.00* (13.00)
COMPAQ DeskPro/Tape Backup System	3,018.14* (65.20)	Sanyo MBC 775 Color Portable IBM Clone 1,775.00* (38.00)	
w/640K/1 Floppy/10MB Hard Disk/10MB Tape		2 Drives/Color Monitor/256K	
Drive/Monitor			

PRINTERS

	Wholesale		Wholesale
Citizen MSP-10 NEW	\$280.00* (6.05)	NEC 3550 33CPS Letter Quality Printer	\$960.00* (20.00)
160CPS/80CPL/Fric + Trac		NEC 8850 55CPS Printer	1,330.00* (28.00)
Citizen MSP-15 NEW	\$399.00* (8.62)	Okidata ML 182 New 120CPS/LQ	200.00* (4.00)
160CPS/132CPL/Fric + Trac		Model FRCB/IBM Graphics + more	
Citizen MSP-20 NEW	\$399.00* (8.62)	Okidata ML 192 New Sleek Design!	325.00* (7.00)
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Citizen MSP-25 NEW	\$520.00* (11.23)	Okidata New Color 20 COPS/100 +	109.00* (2.00)
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C. Itoh F101/40 Starwriter 40 CPS LQ	875.00* (18.90)	(Requires Interface)	
C. Itoh Prowriter 8510 AP	285.00* (6.16)	Okidata NEW/IBM Interface for Okidata	65.00* (1.00)
Color 20		Okidata ML84P 200CPS 132COL	599.00* (12.00)
Epson LX-80 100CPS 80COL LQ Mode	205.00* (4.43)	Okidata ML93P 160CPS Wide Paten	533.00* (11.00)
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Epson FX-80	295.00* (6.37)	Qume Sprint 1140 40CPS Letter Quality	1,155.00* (24.00)
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NEC 2030 20CPS LQ Parallel	605.00* (13.00)	Toshiba P-1340 BCOL Version of P-1351	530.00* (11.00)
NEC 2050 20CPS Letter Quality Printer	605.00* (13.00)	Toshiba P351 New! 288CPS/132COL	1,110.00* (23.00)
NEC 3530 33CPS LQ Parallel	960.00* (20.74)		

COMPLETE SYSTEMS

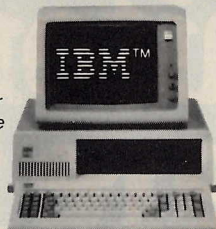
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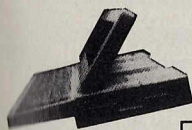
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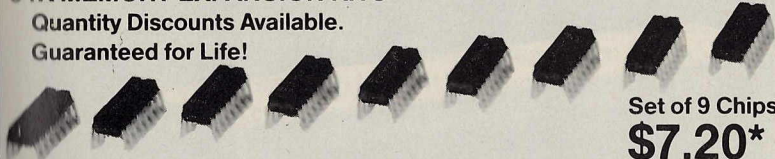
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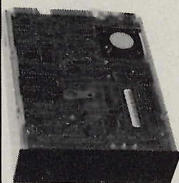
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Inquiry 31

At NEC, monitors and printers are not peripheral issues.

All too often, brand-name CPUs are "bundled" with mediocre peripherals — a practice that makes for profitable sales, but does nothing for the system's performance.

In Japan, where most computer peripherals are actually built, NEC is the largest personal computer company — by far. And NEC didn't make it to first place by offering second rate peripherals.

The monitors with the broadcast video heritage.

While dozens of companies market display monitors, only a handful possess the tube technology and manufacturing capability to actually *build* them. NEC is one of the few. In fact, NEC's complete line of color and monochrome monitors reflects the professional and broadcast video

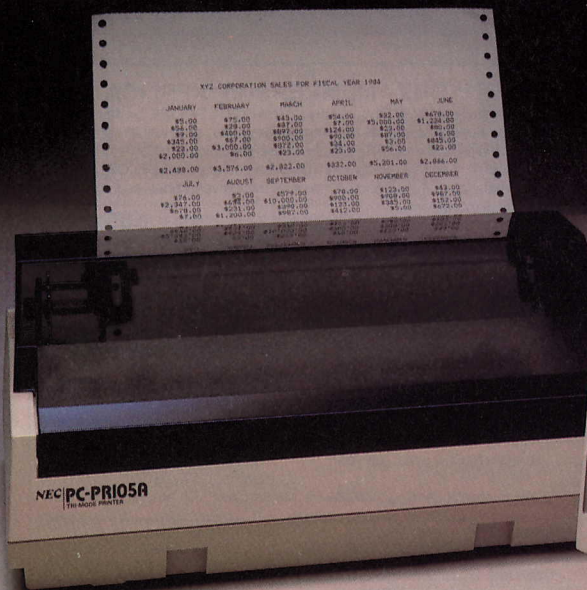
expertise that twice earned NEC Emmy Awards from the National Academy of Television Arts & Sciences.

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Ask people who really know about printers, and they'll tell you that NEC builds the best. They may also point out that NEC builds printers for other computer companies. And if you ask them to choose one word to sum up what makes NEC printers stand out, it will probably be "reliable." This is why NEC has become the printer of choice for the most demanding installations.

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MARKETPLACE

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*Free software is going commercial,
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artificially high program prices*

Blue, on the other hand, tends to be overwhelmed by stronger colors, which makes it a good choice for data that you'd just as soon not emphasize.

Even though some graphics software offers more shades and hues than a 64-pack of crayons, you'll do well not to use more than three or four in a single image. (Again, those people in your audience who have some degree of color blindness wouldn't be able to make sense out of a dozen shades anyway.) Text and background are colors, too, and there should be a sharp contrast between them and the other elements in any image. Also, when you're presenting a series of images, using color consistently throughout will prevent confusion and take some of the load off labels and other identifiers.

Another important consideration in preparing graphs and charts is the kind of output device available for your presentation. What looks great on your color monitor might become awfully weak when it's put on a slide and projected on a large screen. Experience is the best teacher in this regard; be sure to make a test run with an unfamiliar output device.

And finally, consider the method of presentation. A stand-up talk with flip charts, projected slides, or transparencies puts a premium on uncomplicated images that can be grasped quickly. In a printed report, on the other hand, you can use sophisticated multilevel graphics that require some study.

If a picture is worth a thousand words, it makes sense to be sure that picture says what you want it to. Today's business graphics software and ever more powerful personal computers make it easy to achieve just the right effect, but they also make it easy to toss off images without thinking about them. If you're careful to craft portraits that accurately reflect the personality of your data, your graphs and charts will become much more than mere visual aids—they'll become one of your most effective tools for business communications. —ELIZABETH CUSICK

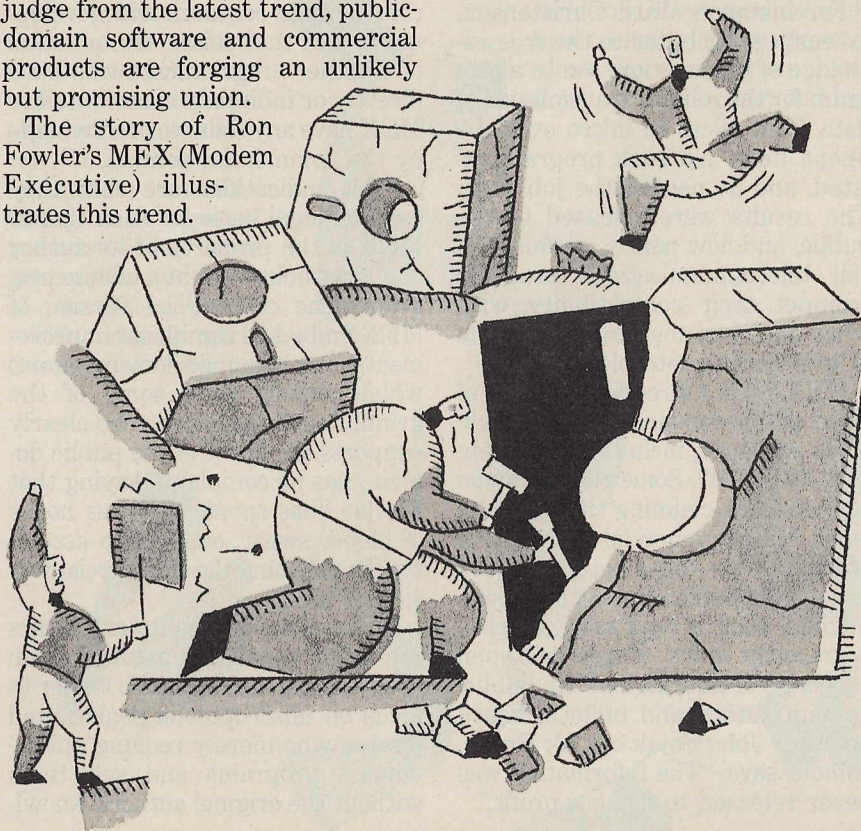
Elizabeth Cusick is the founder of Documentation Consultants, a communications consulting firm in Garden Grove, California.

Public-domain software—that extensive collection of uncopyrighted programs offered at little or no cost through bulletin boards and user groups—can be a treasure trove for those willing to do a little searching. While authors of public-domain programs retain rights to their work, their programs are available to fellow computer users in the spirit of free exchange of information. Since the early days of personal computers, the public domain has stood as a place apart from the commercial market, a place where sharing and cooperation replace the profit motive. But to judge from the latest trend, public-domain software and commercial products are forging an unlikely but promising union.

The story of Ron Fowler's MEX (Modem Executive) illustrates this trend.

In May of 1984, Fowler released MEX 1.0 into the public domain. A solid CP/M telecommunications package with features that rivaled those of commercial products, the free program quickly became a public-domain hit. Seven months later, what was essentially the same program—streamlined, purged of bugs, and prettified—appeared from Nightowl Software as MEX 2.0.

MEX is not alone in its metamorphosis from public-domain plum to commercial product. Rick Conn's ZCPR2 (Echelon Software), A.D.A. Software's "entry-level" Prolog, and King Programming Products' Taxlog



are also commercial products that grew from public-domain programs. As with MEX, the originals remain in the public domain, serving as calling cards for the enhanced, fully documented commercial versions. In this way, public-domain generosity and openness are feeding the appetites of the consumer market, and where the two paths cross is a strange and hopeful land.

The spirit of public-domain software sharing is simple: participants believe in the free and public exchange of information. That's positively unprofitable, frightening, and un-American—or so it must seem to any self-respecting Big Software Company. But the free exchange philosophy was essentially born of necessity. Even a few short years ago, if you didn't write your own programs, that slab of silicon and wire you'd purchased was an expensive desk ornament. To write a useful program on the beast was the reason for its being, and to pass these hard-earned programs along to someone else in need was seen as a basic part of the information revolution that personal computers were creating.

For instance, Ward Christensen, an early contributor to the free exchange of information, wrote a program for the reliable transmission of data from micro to micro over the phone lines. No such program existed, and he needed the job done. The results were released to the public, and now nearly all commercial telecommunications products trumpet their compatibility with what has become known as the "Christensen protocol."

MEX 2.0 is a direct descendant of other public-domain telecommunications packages, including Christensen's MODEM7. Some public-domain contributors, claiming that much of what the commercial version of MEX does so well is based on work done in the public domain, have complained that a profitable release betrays the spirit of free and open exchange of information. As public-domain author and bulletin board operator John Sojak of Oak Brook, Illinois, says, "The information was never released to make a profit."

To make matters more complicated, MEX 2.0 runs on a variety of specific machines—from Apples to Zorbas—only because machine-language code was added to the base program to adapt it to the hardware peculiarities of individual makes and models. These specific adaptations, or overlays, were written by dozens of people as their needs dictated.

SOFTWARE

**vendors are likely
to run into stiff
competition from
maverick developers
who use the public
domain as a site for
beta testing.**

Each modification was released free of charge, allowing MEX to reach more and more computers. In commercial terms, then, public-domain authors have been responsible for considerable research and development, and that raises the question of whether programmers who have directly or indirectly contributed to MEX have any claim to profits made by the commercial version.

First indications are that they have no legal basis for such claims. MEX is the property of its author and is without a doubt a unique program. The commercial version of MEX embodies significant improvements over its public-domain parent, which should quiet some of the grumbling. John Sojak, who clearly supports the spirit of the public domain, has no complaint, saying that Fowler "has spent countless hours of blood, sweat, and macro assembly" in polishing the commercial version of MEX.

If questions of legality and ethics are asked regarding public-domain programs, critics might do better to focus on unscrupulous dealers and pirates who merely rename public-domain programs and sell them without the original authors' knowl-

edge or consent. Some public-domain programs have even been sold under their original names at prices above what you'd call modest.

So despite the grouching of public-domain purists, the trend that Fowler and others are pioneering is likely to grow. In essence, MEX's stint in the public domain provided some of the best, most thorough beta testing (as software developers refer to the final shakedown of an almost-finished product) any programmer could hope for. What better place to test a new product than a free and open market? Users ranging from novices to professional programmers ran MEX through the mill until nearly every conceivable bug poked its head from the command file. The author incorporated all useful user suggestions in the rewritten, commercial product.

And no one has lost. The public still has free software (in that the earlier version of the program remains in the public domain), the developer gets a truly honest and rigorous test environment, and people who would rather purchase a fully supported and extensively documented telecommunications program have MEX 2.0, which is bullet-proof and inexpensive thanks to its cheap and thorough beta testing.

In fact, it seems that the only reason a greater number of proprietary software developers haven't employed massive public testing of prototypes is nervousness about allowing their code to circulate so widely. But if MEX is a commercial success (as preliminary sales indicate it will be), we ought to see more developers following Fowler's footsteps, which in turn should lead to a greater number of thoroughly tested programs available at lower prices.

But why would someone buy a program if he or she can get essentially the same thing for free? First of all, the savings on development costs can be passed on to the consumer, making programs such as MEX 2.0 quite inexpensive (under \$100). Also many people would rather plunk down cold cash for well-documented software than go after the same program through a user group, a disk-swap meeting, or a

Silicon Valley's Congressman

Representative Ed Zschau brings a high-tech, entrepreneurial background to the nation's capital

lengthy session on a remote bulletin board service. Most of us don't have the time, patience, or temerity to brave obscure on-line log-ons or Saturday morning meetings at a local college gymnasium for a product we can order over the phone or pick up at our local computer store.

So it's really not the spirit of free and public exchange that is being threatened by public-to-proprietary transformations. What may well be threatened, though, are the typically high prices of commercial products. Software vendors are likely to run into stiff competition from developers who use the free public exchange to beta-test programs that they can then offer at lower prices.

Also, the public-domain-to-commercial-market route will be an attractive one to the freelance software developer. Gone are the days when software companies were desperate for hot-shot programmers whose work they could market, turning the programmer into a millionaire in the process. Most companies now employ their own developers and are much less receptive to the efforts of freelancers. But the midnight programmer who follows Ron Fowler's example may find he or she can go it alone.

Finally, though, the story of MEX's move from public domain to commercial market shows that the the good ol' days of the public domain are passing. "User-supported freeware," underwritten by strongly encouraged donations, is replacing absolutely free software, and more and more on-line software exchanges are becoming private, with access restricted to dues-paying members only. While the old guard may gripe about public-domain programmers who have "sold out," most of us are going to benefit from the inexpensive, high-quality software they're developing. By giving the little guy a more even footing with established software vendors and allowing for more competitive pricing, the growing use of the public domain as a software testing ground should lower the cost of all software, no matter who publishes it.

—STEVEN BOSAK

Steven Bosak's novel *Gammon* was published by St. Martin's/Marek in April.

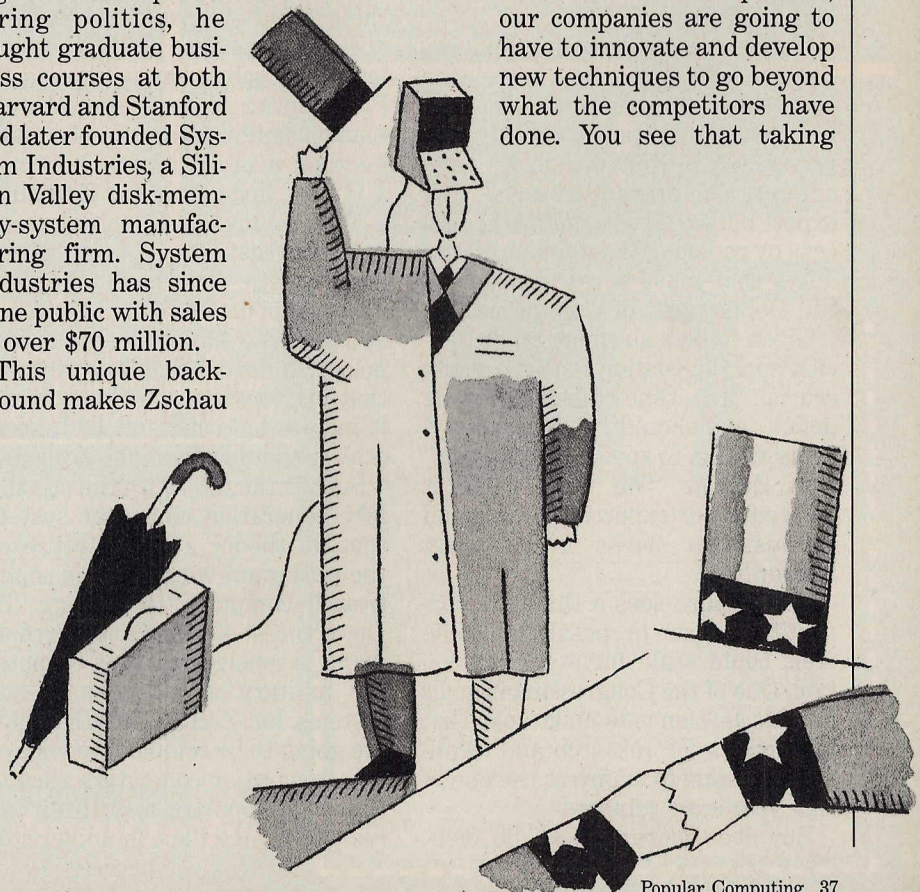
I guess you'd say I'm a political entrepreneur," reveals Congressman Ed Zschau. "I'm trying to make things happen and taking some risks to do it."

Forty-five-year-old Zschau (pronounced like the first syllable in "shower") is now in his second term as representative from California's 12th Congressional District, which includes such high-tech boom towns as Cupertino, Sunnyvale, and Palo Alto. In electing Zschau, Silicon Valley voters chose one of their own, a computer scientist and successful high-tech entrepreneur. Before entering politics, he taught graduate business courses at both Harvard and Stanford and later founded System Industries, a Silicon Valley disk-memory-system manufacturing firm. System Industries has since gone public with sales of over \$70 million.

This unique background makes Zschau

a dynamic politician with definite ideas about the government's role in business, trade, and research. But despite the more than 700 high-tech firms in his district, Zschau doesn't believe that high technology is necessarily the answer to the country's economic ills.

"The technology sector is still a small part of the economy," he says. "We should be promoting growth wherever it is." Zschau's feeling is that the potential for such growth abounds. "There are a lot of opportunities that some people have written off. If we want to be competitive, our companies are going to have to innovate and develop new techniques to go beyond what the competitors have done. You see that taking



place in the steel industry, with mini-mills, micro-mills, and specialty steel made with new manufacturing techniques."

Zschau's emphasis on the need for innovation is evident in his work as chairman of the House Republican Research Committee's Task Force on High-Technology Initiatives. He feels that the government cannot make innovation happen, but it can and should help create an environment that fosters it: "Our R & D policies and our fiscal and monetary policies, trade policies, education policies, and tax policies all affect this environment, and we should modify [those policies] to improve the environment for innovation."

Six bills that grew from the Task Force's work were passed last year, and in this session Zschau is excited about the prospects for an export bill he has introduced. This legislation is designed to speed up the now lengthy licensing procedure that manufacturers must go through before they can export their products. While it will affect all manufacturers, it could be especially important to high-tech firms.

Under current licensing policies, Zschau feels, we have "in essence been shooting ourselves in the foot by constraining trade so tightly that we not only prevent technology leakage but also prevent exports." The export bill would streamline the process by reducing the number of products that must be scrutinized by the Department of Commerce.

Given today's alarming trade deficits, such legislation is particularly crucial. "In a time of growing trade deficits we should be doing everything we can to speed up licensing," says Zschau. "We must make it easier for our exporters to respond to customer needs in a timely fashion."

Zschau also sees a threat in current tax reform proposals, which he feels could stifle high-tech innovation. One of the Congressman's goals for this session is to make sure that tax credits for research and development—due to expire at the end of this year—are renewed.

But even more critical, he feels,

are the special tax rates on capital gains. The Treasury Department's tax-reform proposals announced last November suggested raising the tax on capital gains, but Zschau feels that "if this particular proposal were enacted, it would be devastating to high-technology companies. The lower rates for capital gains as opposed to ordinary income have

ZSCHAU FEELS
that despite the
Pentagon's research,
competitive fifth-
generation computers
will come from the
private sector's
development efforts.

played a vital role in making sure that we have had enough risk capital and venture capital to start new companies and continue to finance them as they grow." Along with about one hundred of his House colleagues, Zschau has petitioned the President to preserve special treatment of capital gains when he makes his final decision on tax reform.

It's not surprising that Zschau, as a former high-tech entrepreneur, believes that the private sector, given a little governmental encouragement of innovation, can preserve and increase America's lead in technology. Indeed, he's uneasy knowing that private companies are finding it increasingly difficult to fund research-and-development projects.

Such is the case with the so-called fifth-generation computer systems that, in theory at least, represent the next giant step ahead in sophisticated computer technology. The Department of Defense is currently doing extensive research on potential military applications of such systems, but Zschau feels that "if we are going to be competitive with our fifth-generation computers, then the actual development, apart from basic research being done in universities,

will probably come out of the private sector rather than from some classified government project."

Zschau's belief that the private sector provides the best avenue for innovation and research clearly represents the prevailing attitude of his constituency. But some people in Silicon Valley feel threatened by the high-tech manufacturing facilities in their neighborhoods, and they have good reason: pollution of local water supplies by toxic solvents used in semiconductor manufacture has become a real problem (see "Poison in the Valley" on page 22).

The Congressman is sensitive to this—indeed, he suggested at one point that the whole of Silicon Valley be put on the EPA's Superfund cleanup list. But he's optimistic because electronics manufacturers in the valley have formed their own environmental task force to coordinate cleanup efforts and share the technological information that will help prevent future contamination of water supplies. "I think that the elements of a solution are there," Zschau says. "The first and most important element is the commitment by industry to deal with the issue."

Also, Zschau is encouraged by the extent of the cooperation among federal, state, county, and regional agencies to put together an integrated environmental control plan for the valley. "This is an interesting example of government agencies coordinating their efforts rather than passing the buck."

Ed Zschau believes in the resourcefulness of private companies and sees them as the key to America's continued success in the development of high-tech products and solutions. But when I asked this Silicon Valley representative if he used a personal computer in his own work, he admitted that he did not. "My staff and other people use computers to get the information I need. But frankly it is very difficult in this job to get a lot of leverage out of using a computer," he confesses. "You get leverage out of using people who use computers."

—ROY KATZ

A book review by Roy Katz appeared in the April 1985 *Popular Computing*.

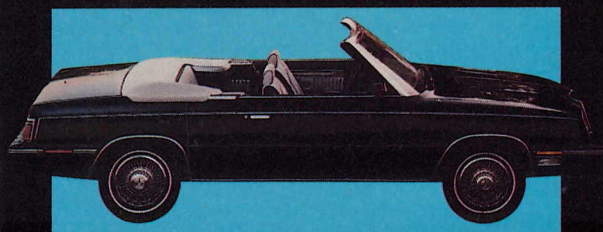
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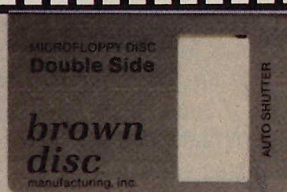
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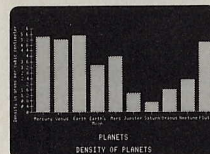
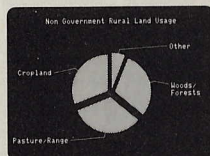
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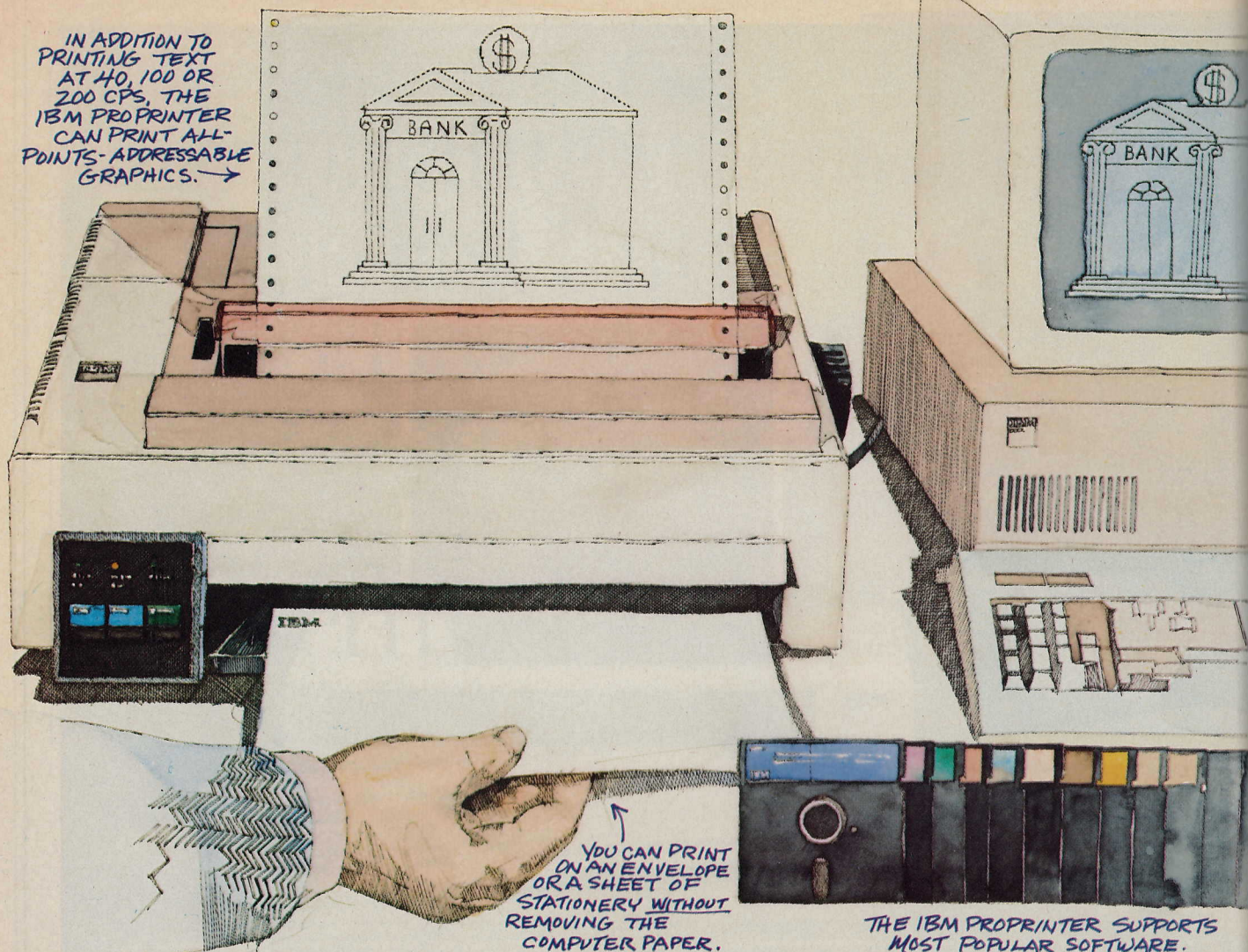
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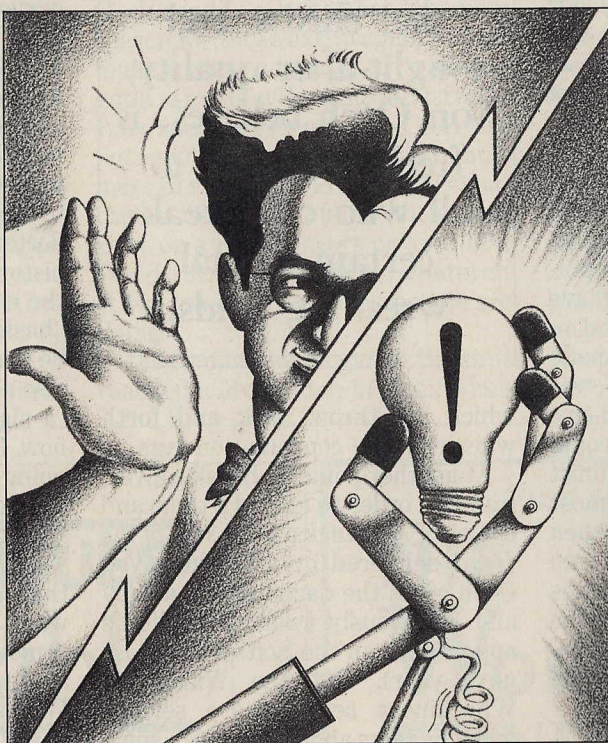
Selling Creativity

Roger Von Oech looks like Clark Kent. With his natty three-piece suit and spectacles, this tall dark man in his late thirties (he seems younger) has that same Chris Reeves look of an athlete hemmed in by fashion's trappings. Indeed, Roger Von Oech was once a swimmer—an All-American, he boasts. He considers his choice of sport to be significant because swimming is not a team effort but an individual venture—"I've always been something of an entrepreneur," he explains.

As such, he is a man the times have accommodated. People who have never thought to make that claim are now clamoring for the fruits of successful entrepreneurship. Team playing is acceptable only as a holding measure and only if ample stock options are provided. No, the idea in business these days is to lead the pack, discover new markets, pioneer new ideas, blaze new trails—to hear Silicon Valley businessmen talk, you would think that the ideal managers are being recruited more from the ranks of wilderness guides than MBAs. In fact, nearly every macho trait that red-blooded American males like to think of themselves as possessing is now being described as a business skill. And at the Hyatt Rickey's Hotel in Palo Alto on a rainy day last spring, Roger Von Oech, Silicon Valley's Wizard of Whackiness, was about to add a few more traits to the list.

Somewhere between 300 and 400

A whack on the side of the head is one entrepreneur's formula for success



seekers of success had written checks of around \$360 to Von Oech's CreativeThink company in order to attend this one-day bash. Perhaps they had heard about his six previous seminars entitled either *Innovation in Industry* (as was this one) or *Success in Software*. In fewer than three years, the conferences have become tiny entrepreneurial Meccas for the cognoscenti of the microcomputer trade.

Perhaps they had read Roger Von Oech's best-selling (over 300,000 copies, its author assesses) *A Whack on the Side of the Head*, in which he explains how to dissolve 10 "mental locks" that prevent exercise of the kind of profitable creativity displayed by the likes of Nolan Bush-

nell, who wrote the book's foreword. Perhaps they were drawn by the list of speakers, who ranged from hacker guru Alan Kay to software guru Mitch "Lotus" Kapor to high-tech venture capitalist guru Ben Rosen, an entrepreneur who is quoted in Von Oech's literature as saying that "entrepreneurs are the rock stars of business." (Ben didn't show—maybe he broke a guitar string.)

Or perhaps they were attracted by the idea of networking with some of the Valley's movers and shakers—the guest list was loaded with luminaries ranging from MicroPro chairman Seymour Rubinstein to Macintosh "software wizard" Andy Hertzfeld. The latter might well be inferred as a motivation when Von Oech implored each and every attendee

in the cavernous, carpeted hall not to leave before generating seven new ideas and a whopping 23 new contacts. Whereupon he instructed them to turn to their immediate neighbors and indulge in ritual business-card exchanges.

But the heart of the matter was in Roger Von Oech's opening message, in which he revealed the basis for the sequel to *A Whack on the Side of the Head*, to be entitled *A Kick in the Seat of the Pants*. It was then that he provided his new metaphors for the creative businessperson. With the aid of audiovisual props—Von Oech gives the best "AV" in the

New York-based Contributing Editor Steven Levy's latest book, *Hackers* (Doubleday, 1984), proves he's no stranger to creativity himself.

business—he explained that at various times one must master one of four mindsets. Next time you try to come up with a new software product, pretend you are the explorer, the artist, the judge, or the warrior.

Then he introduced the next speaker, using a method that has become a tradition in his conferences: he showed a television commercial. The commercials, often award-winners in their field, may not have much to do with the speakers (they range from the famous Apple “1984” spot to McDonald’s ads), but they are uniformly well made and clever; the audiences watch them as if they are artistic statements of some sort and not merely sales pitches.

The conference went on with the speeches of venture capitalists, microprocessor scientists, computer industry analysts, and entrepreneurs like Mitch Kapor who have been to the mountain and lived to tell the tale. Von Oech also made sure the day’s “Fun Quotient” was fulfilled by distributing hand-size leather “unballs” that you could throw around, a wandering violinist at the sit-down lunch, and the most frivolous moment of the day when 350 people inserted batteries into strange-looking pink plastic boxes Von Oech had handed out, and the boxes loudly erupted in a weird tinny approximation of a crazed man having a laughing fit.

Von Oech at Home

I think the last laugh has to go to Roger Von Oech. He has catapulted himself from the anonymity of an IBM marketing man in Seattle into a successful high-tech thought-swami, and done it by insisting that creativity, that elusive characteristic identified with artists, poets, and explorers (if not judges), is not limited to the Einsteins and Nolan Bushnells, but a free commodity, available to anyone who can break certain mental wrestling holds and free his or her thoughts.

What’s more, the capacity to innovate is no less mystical when applied to less lofty goals than writing *Childe Harold*, painting “Nude Descending a Staircase,” or formulating quantum theory—creativity is some-

thing you can make a buck with.

This is the message Von Oech impresses me with when I see him at his office, a nicely furnished half of the garage beside his Menlo Park split-level home. It is two days after the conference. No sooner do we sit down on the modular couch for some serious talk does he jack up the fun quotient by tossing me an “unball,”

CREATIVITY,
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which we throw back and forth whenever the conversation lags.

At another point we break conversation in order to unload a thousand copies of *A Whack on the Side of the Head* delivered by a trucker (Von Oech gives the dazed driver a copy and I anxiously await this fellow’s appearance on the Softsel Hot List next year). But the Wizard of Whackiness seems more serious when he talks about his role in spurring general creativity:

“I don’t know if anything I do is going to lead to another Einstein,” he explains, “but let me give you a metaphor for what I do. Look at it like a batting coach. Typically a team might have an average of .250 or whatever. A coach may give them tips and raise their average from .250 to .252. That doesn’t sound like a lot, but over the course of a season, that’s four game-winning hits, which might be the difference between second and third place. That’s what I see myself doing. Rather than getting 5000 ideas next year a person might get 5030. But they might act on a couple of them and make a big difference.”

“Are you calling yourself the Charlie Lau of creativity?” I ask, refer-

ring to a legendary batting coach.

Roger Von Oech shrugs modestly. “Could be.”

The Making of a Marketer

You might well wonder how one gets to be an innovation coach. Well, as with many startling Silicon Valley success stories, it all began in the sixties. Roger Von Oech swam into California in 1965 and came back in 1967, whereupon he did the kinds of things people did in those zany days. “I had some real mind-opening experiences then,” Von Oech remembers.

It was also the spirit of the sixties that led Von Oech to enroll in graduate school (although another factor was the Vietnam war, a mind-opening experience Von Oech preferred to avoid) and embark on a self-styled doctoral program dealing with the history of ideas. Von Oech describes the wide-ranging course of study as “basically what philosophy used to be before the twentieth century,” also noting that the whole thing was “a sign of the times—if I were 22 now, I don’t think I’d waste my time going to graduate school.”

After that experience, Von Oech “wanted to get grounded in the real world.” What better place to do that than at IBM? When young Roger went to his job interview he was armed with an anecdote he’d read about former IBM chairman Tom Watson, who once complained to his board of directors that everyone at IBM looked, dressed, and thought the same. (Did Watson think this was some accident?) The Chairman told his board that the company could use a few “wild ducks.” Exactly the kind of metaphor that Roger Von Oech, even then, could clutch onto. So when the interviewer asked Roger what he felt he could contribute to IBM, Von Oech responded, “I’m a wild duck!” His reward was a job marketing databases in Seattle.

“The key things I got from my IBM experience? One is that you can have a great idea but you’ve got to implement the thing. But the big thing I saw was that the people at big companies are smart, but their thinking is incredibly narrow. So I saw that if someone had a seminar

to say, 'Hey, look what you're missing!', he'd do well."

Von Oech, then a 29-year-old without children or mortgages, decided to hold those seminars. Starting with high-tech firms like SRI and IBM, he developed a style where he would take a small group of people and urge innovation in their work. He drew on his background (to which he often refers as "weird") but cannily discouraged any direct connection to the zonked-out sixties and the hedonistic, self-help seventies. "I wanted to make very sure that I was never really confused with any touchy-feely kind of stuff. So I always tried to position myself more on the lines of business and consulting."

The seminars seemed to work because, as Von Oech notes, "If people are going to spend hours at a job they want more than a check and dental benefits: they want a chance at creativity." He had correctly grasped that the eighties would be a decade of indulgence in work,

where economic desire and self-realization would be merged into a single concept. Von Oech's seminars worked well, and new clients signed up, including NASA, DuPont, Hewlett-Packard, Colgate-Palmolive, and a young company called Apple. Von Oech found himself a very profitable consultant.

Woodstock of the '80s

It was a natural step to running big conferences like the Innovation in Industry confab I attended. Von Oech readily admits that the main reason for these extravaganzas is to make money but says, "It's also to get a sense of where the industry is. It's a sense of community. There are not many chances for people in business to stand up and feel good about themselves. I don't know if it's a pep rally or a rock concert or kind of a Woodstock of the '80s or whatever. It validates what businesspeople are doing."

The conferences began in 1980 but reached a fever pitch in 1982, when

"software" was kind of a mantra for fortune-seekers. "I don't know what the gold rush was like in the 1850s," says Von Oech. "But that's what these conferences were. We tapped a nerve—650 people paying around \$300 each! Everyone was sweeping in here, dollar signs in their eyes. I think people are somewhat more sober now."

Branching Out

And Roger Von Oech can read the writing on the wall. A *Whack on the Side of the Head*—named after the stunning realization one gets when everything becomes clear—was his first foray into true mass communication. A large paperback, it's loaded with upbeat cartoons, zen parables, bad jokes, and the now-familiar Von Oech litany, which boils down to one sentence: attack your problems by looking around, taking chances, and having fun with them, since the risks you'll be taking are nothing compared to the gains you'll get. To buffer this worthy argument, the

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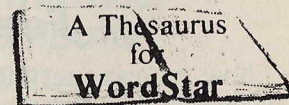
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book draws from the wisdom of Pablo Picasso, Woody Allen, Napoleon Bonaparte, Alexander Pope, Frederick the Great, Alan Funt, George S. Patton, and Steve Jobs, among others.

Von Oech self-published the book, tapped his 10,000-name mailing list for the first wave of buyers, and signed with Warner Books, which has shipped zillions of copies. He gets letters all the time now from *Whacked* people telling him how the book changed their lives. His next, the aforementioned *Slap*, won him a six-figure advance. No wonder he talks now of shifting his attention to "products."

Spreading the Word

"I don't know how creative I am—I know seven things," he explains. "But I'm able to express them. So, basically, I got here first, and now I'm associated with a lot of creativity things. I'd like to turn more of what I'm doing into products." Like more books. Or maybe a movie. Von

Oech believes his message is an important one—Innovation Belongs to the People! And Is Profitable, too!—and wants to spread it.

He has no idealistic illusions about what it will take to spread that message, either. At the root of his success is not only a good idea, but the stomach to sell it.

"I've seen people with really good ideas not go anywhere because they couldn't sell them to the people who could help actualize them," Von Oech says. "I think when you live in a market economy, you have to be selling all the time, whether it's to your wife or your kids or your publisher or whatever. And an idea I believe in is something I call selling the product of the product. You know, what your idea, your product, your concept does for the person who has to buy it."

At that point Von Oech launches into an anecdote. It is the famous one about Charles Revson, head of the Revlon cosmetics empire. Someone asked him what product his firm

made. Revson said, "My dear lady, on the factory floor our product is cosmetics. But in the department stores my product is hope."

Similarly, Von Oech explains, he is not selling innovation or creativity as much as what it can do for you. Ultimately, as he says, "Everything's salesmanship, right? Well, not everything, but a lot of it."

The Right Metaphor

Yet even Roger Von Oech, whose creativity business annually grosses sums exceeding a quarter-million dollars, is not satisfied with the metaphor of The Salesman as a self-description. He does, after all, revere the lessons of the sixties. "This is a business and there are certain kinds of business things I do," he says, "but I still consider myself first and foremost an artist."

Perfect. ☐

Steven Levy welcomes your comments and suggestions. You can contact him on The Source (ID TCT670) or Compuserve (ID 72065, 635) or by writing to him c/o Popular Computing, POB 397, Hancock, NH 03449.

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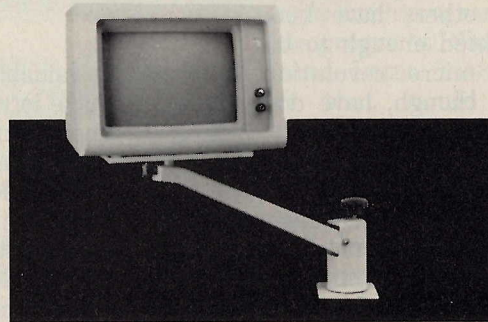
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The EDP Manager's Blues

Of the billions spent on computers, most still goes to large electronic data processing (EDP) departments. The very name is instructive, deriving from a time when there were ways other than electronic to process data and do payrolls. The EDP shops typically do most of the computing for big firms, using large computers and billing departments for service.

When microcomputers first appeared, the typical EDP manager's reaction was to treat them with scorn and contempt. What could these toys do? Now the EDP establishments are under increasing pressure from microcomputers. Some EDP managers long ago concluded that if you can't beat the micro revolution, you ought to join it. Some others have been farsighted enough to become micro revolution leaders. Many, though, have done nothing but curse micros.

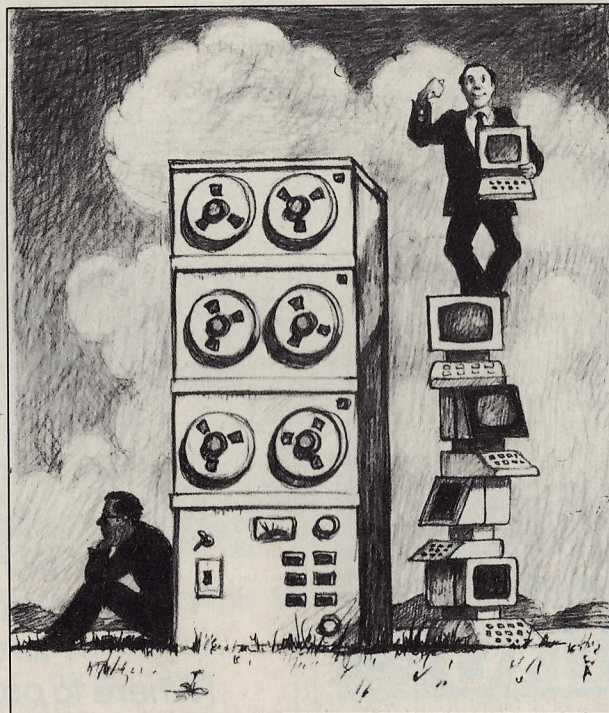
Prophecy

The distinction between micros and minicomputers will vanish within five years, and micros will eventually absorb most functions now done by mainframes.

This is an easy prophecy to make. The trend is perfectly clear: the amount of memory per dollar has doubled every year for over ten years. Other measures of computer power show the same tendency. Big, powerful machines are available at increasingly low prices.

Like most prophecies, mine is useful for long-term planning but not

The revolution has caught up with him, and he must join it or perish



so valuable for getting rich quick. To make lots of money in a hurry you need to know not only what's going to happen, but *when* it will happen; and while it's easy to see what micros will do, it's nearly impossible to predict the exact schedule.

An analogous situation was trucks and aircraft vs. the railroads. Back in the 1950s ten minutes' thought would have shown that the railroads were in trouble as trucks took over freight hauling while airplanes ate their passenger revenue. However, long after that trend was obvious, the financial news always included not only the Dow Jones average of industrial stocks but also the index for "twenty rails," and market analysts had elaborate theories based

on the performance of rails vs. industrials.

In reality railroad stocks were headed for the cellar. Predicting that was easy. What wasn't so predictable was how long the combined forces of the railroad owners and workers would be successful in getting government to prop things up.

Micros grind on large centralized EDP shops in the same way that trucks and airplanes eroded the railroads. There was never a single moment when rails were knocked out, and indeed they're still around; but "twenty rails" is no longer reported in the financial news. Similarly, minis and mainframes will be with us for a while; but the trend is toward *distributed* computing and away from the EDP centers.

One of the classic arguments for central computer establishments goes something like this: "We have to have the big machine to do our major work. That takes about half the machine's time. We may as well do something useful with what's left over." The EDP manager then offers to do payroll, accounting, and a myriad of other tasks in addition to the big number-crunching project the machine was acquired for.

It used to make sense. In times past, the large centralized computer was horribly expensive; wasting computer time already paid for was stupid. However, that argument has merit only so long as there are real

Science fiction writer Jerry Pournelle, who joined the micro revolution eight years ago, is a contributing editor of *Popular Computing*.

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The E

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savings to be had in centralization. Lately, though, micros can do many jobs so cheaply that there's comparatively little to save.

Companies that still operate centralized EDP plants to provide computer services to all the other departments are discovering a curious thing: for the money each department annually pays to EDP, the department often could buy its own small computer, complete with peripherals and programs, and have enough left over to train operators. They could even buy a second machine as backup. I've found that the ultimate service contract is to have two or more machines each capable of doing the whole job.

Decentralization means flexibility, since the EDP shop rarely can provide each department precisely what the department needs. Centralization almost always involves compromise. Moreover, when computer operations are under departmental control, department heads and their staffs have high incentive to look for ways to let computers save them work. In companies with centralized computer facilities, whenever a job is computerized, the department loses an employee while the EDP shop's budget and power grow.

The result is increasing pressure for departmental independence. This is especially true in the smaller departments whose jobs have low priority in the EDP system. Managers often feel they are being taxed to support a nonresponsive system that looks to meet EDP requirements first and provide services second.

The Budget Spotlight

About the time the EDP manager begins to fight this tendency, he discovers something else: his budget gets new scrutiny from higher management.

It generally happens this way. The president of the firm has been impressed with something that can be done by a micro.

The micro's capabilities give the president an idea. Perhaps it's for a new kind of report or a financial model. Whatever it is, it will make the president's work easier. He calls

in the EDP manager and explains what he wants. The EDP manager thinks about it for a moment. "I can do it," he says. "I'll have it in about six months."

"Six months?"

"Yeah, about that. It's going to cost a bit. I'll need to hire in a new programmer."

"New programmer? Why?"

"Well, all my people are already working overtime, and I'll have to put *somebody* on your job. . ."

"Why do you have to have some-one program it at all? Just buy a program to do it."

"That might be cheaper, all right."

"How much?"

"Oh, thirty thousand dollars."

No matter how the rest of the conversation goes, the president, remembering that the program that impressed him sold for well under \$1000 and ran on a computer that cost no more than \$5000, isn't going to be happy. Perhaps the EDP manager is able to explain: the market base for microcomputers is so large that software developers can afford to put many man-years into devising complex new programs. Perhaps he doesn't get a chance to explain. Either way, the president isn't going to champion the EDP department at the next meeting of the executive committee. When other departments ask for their own micros, the president is going to be sympathetic.

Decentralization wins again. Sooner or later, and I think sooner than most suspect, the EDP shops will be fighting for their very lives—just as the railroads are today.

What, then, should the poor EDP manager do?

First, stop fighting the system. You can't beat the micro revolution—so you must join it.

How to Join

Get some microcomputers. Not just one. Get copies of many different kinds of machines. IBM PC or PC clone. Z-100. Tandy. Stride. CompuPro. Macintosh. Maybe \$50,000 worth of machines and another \$10,000 in software. Then set aside an hour a day, two if possible, to work with the micros. There won't be any time, but make the time. If you have to use weekends, do it. The

investment is worthwhile.

Second, make some of your key people do the same. Tell them they will find an hour a day to experiment with microcomputers and you expect regular and frequent reports on their progress.

After familiarization, begin some serious work. For example, I would learn just about everything there is to know about the major database programs for micros: dBASE II, naturally, but also as many others as possible. Savvy. R:Base. DB Master. MacLion.

In addition to database programs, look at financial modeling (spreadsheet) programs. SuperCalc. MultiPlan. Lotus 1-2-3.

Finally, do any of the senior executives use micro programs? If so, be *sure* to get those and learn them.

That's the general strategy. Now to particulars: look at data structures. What format do the micros want? How hard would it be to put company data from the EDP databanks into that format? Just how difficult would it be to let the big central machines feed different kinds of micros? Could we simply and easily pump data into a Lotus spreadsheet? If not, why not, and how can we get that done?

Local Hero

Micro database programs are powerful. You can write a whole accounting system in Savvy or dBASE II, which are as much programming languages as programs. Similarly, SuperCalc and Lotus 1-2-3 have capabilities that would have astonished mainframe programmers ten years ago.

It's not hard to be a hero. With a bit of work microcomputers can take the output of the EDP shop and massage it into maximum usefulness for other departments. For the price of one or two of those big specialized programs, you can have a whole raft of small programs that work like magic.

EDP shops can't beat the micro revolution.

It's not too late to join it. ☐

Jerry Pournelle welcomes comments from members of the micro revolution. Write to him c/o *Popular Computing*, POB 397, Hancock, NH 03449. Jerry tries to answer all his mail but cannot promise individual replies.

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August 1985 —

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January 1986

Words: Designed for lawyers, doctors, writers, insurance adjusters, product managers, marketing managers or anyone else whose primary job function requires the manipulation of words. The software to be described would include word processors, word processing templates, outlining programs, spelling checkers, print formatters, mailing programs, and keyboard enhancers. Peripherals would include printers, keyboards, monitors, mice, multifunction cards, and hard disk storage. Books, online services, and seminars would be vertical resources.

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Database Frontiers

Once upon a time, not too long ago, it was easy to categorize database programs.

Sure, you could quibble over what to call a particular program—a simple file manager, a relational database that lets you work with multiple files at the same time, or something in the nebulous middle ground. You could also argue about which program was most powerful for specific applications, which was easiest to use, and whether a menu-driven database was better than one that required a procedural programming language.

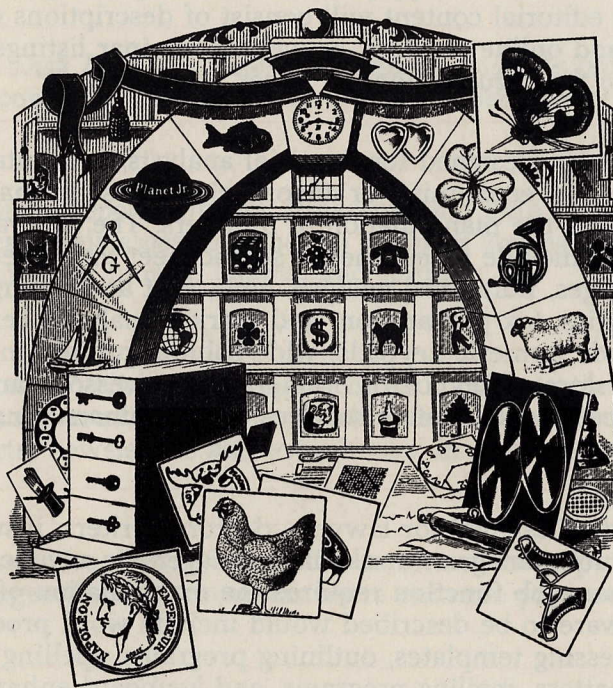
But all of the software fit nicely into the more general category of information management programs that could be differentiated by the number of records in a file, the number of fields in a record, and the number of characters in a field.

Now even that has changed. Over the past few months, we've seen some database programs that use graphics in entirely new ways, others that let you store and retrieve free-form text, and still others that give you new capabilities within the traditional database structure.

Seeing in New Ways

On Apple's Macintosh, even the most straightforward database applications look somewhat different from their predecessors. For instance, both DB Master (Stoneware, San Rafael, CA) and MacLion (Computer Software Designs, Anaheim, CA) allow for multiple fonts, some-

Graphics and free-form text take information management programs where no database has gone before



thing that those firms' previous database programs couldn't do. And those programs, as well as Overvue (Provue Development Corp., Huntington Beach, CA)—basically a file manager that will work only with files that reside in memory but can select and sort records faster than a speeding bullet—use pull-down menus and dialog boxes that make the programs much easier to learn and use.

Other Mac programs give you even more unusual capabilities. Microsoft File (Microsoft Corp., Bellevue, WA) may look like an ordinary file manager at first glance, but it has one important difference: not only can you store numbers, text, or dates within the fields of the record,

you can also create picture fields. As a result, you can use pictures as labels to tag different types of information within the file or store MacPaint drawings, Microsoft Chart graphs, and such for illustrating reports.

Filevision (Telos Software, Santa Monica, CA) takes a radically different approach by using pictures to store other kinds of information. One of the program's examples shows a drawing of a wine cellar that you can use to pinpoint a particular bottle and call up text data such as the winery it came from, its vintage, or your personal rating of the wine's quality.

Both Microsoft File and Filevision let you store pictures but do it in very different ways. In Microsoft File, the pictures fit within fields as part of the tradi-

tional database structure; in Filevision, this is reversed—the fields are attached to the picture.

Graphics are used in yet another way in Helix (Odesta Corp., Northbrook, IL). In this visually oriented program, you use icons to create fields, design forms, and set up the relationships between different fields in a database. Because the relationships are shown graphically, they are easy to grasp.

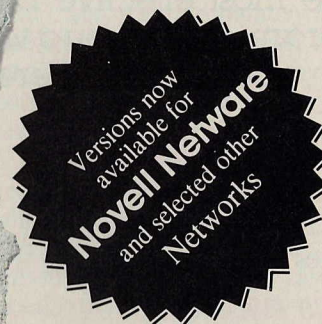
All these programs let you store and retrieve information, but that's about all they have in common other than the machine they run on and the basic Macintosh user interface. They are vastly different from each

Michael J. Miller is a West Coast editor of *Popular Computing*.

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other and from the programs that until now defined the database category.

What has caused all these changes? The Macintosh, in part. Until recently, nearly all database programs (in fact, nearly all programs) were written for character-based environments in which information is displayed on the screen, then stored in files one character at a time. Such environments are standard on the Apple II, IBM PC, and similar machines.

But Macintosh comes with a bit-mapped, graphics-based environment in which information is put on the screen one dot, or pixel, at a time, and each dot is controlled by one bit of memory. This environment allows for the Mac's unique user interface, but it also makes it easy for program developers to use icons, allow for multiple fonts, and import graphics and other data from other files.

Innovative software vendors were not content merely to adapt old-fashioned database programs to the Macintosh user interface; rather they capitalized on the ability of that interface to support radically different methods of managing information—for example, Helix's use of icons and Filevision's use of graphics.

These programs have generated a lot of interest and a fair number of sales. As a result, many of them will undoubtedly be offered for machines that can run graphics-based environments like Microsoft Windows or Digital Research's GEM.

Text Databases

The availability of bit-mapped graphics is only one factor affecting information management programs. Even within the character-based environment, database programs are changing.

In the last few months, several text-based, or free-form, database programs have emerged, some with the capacity for large text fields. With these programs, instead of storing records and fields in the traditional manner, you can store ordinary text, such as documents produced by a word-processing program.

Using keywords that you enter for

each piece of text that you store, these programs can find the documents for you later. For instance, you might store magazine articles on a variety of subjects, then retrieve all the articles that are about spreadsheets.

Programs that emphasize such free-form text storage include Dayflo (Dayflo, Irvine, CA), The Idea

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Processor (Idea Ware, New York City), and Executive Filer (Paperback Software, Berkeley, CA—actually a revised version of the Idea Ware product) for the IBM PC, as well as Factfinder (Forethought, Mountain View, CA) for the Macintosh.

Text databases vary in how they store information and in how easily they allow you to retrieve it, whether by keywords or by any phrase in the text. But essentially, they all work with text in ways not possible with the more traditional file managers.

Other changes are also affecting the character-based, traditional database products. More of them can handle complex applications. For instance, R:Base 5000 (Microrim, Bellevue, WA) now has a program generator that makes it easy to set up a database with menus for form entry. And some databases, such as Reflex (Analytica, Fremont, CA), have analysis features that let you view your database almost as if it were a spreadsheet.

Bigger and Faster

In addition to changes in information management software, two ma-

jor trends in hardware—faster processors and more and cheaper user memory—are also changing the way we can use these programs.

Central processors such as the Intel 80286 used in the IBM PC AT and the Motorola 68000 used in the Macintosh can sort records very quickly, and cheaper memory makes it economical to have even larger files of information, with many more records. The additional memory may make it possible for all these different kinds of database programs to coexist rather than compete with each other.

Traditionally, all information management programs—from the simplest file manager to the most complicated procedural database—have been in competition with one another. A typical computer user generally had one word-processing program, one spreadsheet, and one information manager. If you used dBASE II, you probably didn't use PFS:File, and vice versa.

Nowadays, that isn't necessarily the case. I can easily imagine someone keeping a map of a warehouse in Filevision, a set of project notes in Factfinder, and a list of names and phone numbers in Overvue. And coexistence will be even easier with computers that offer more and more memory and with programs that let you split a machine's memory into several sections, running several programs at the same time. With environments such as Microsoft Windows or DRI's Concurrent DOS or simpler programs such as Memory/Shift (North American Business Systems) and Hammer & Associate's E-Z-DOS-IT for the IBM PC, it becomes possible to run more than one information management program at the same time. And Andy Hertzfeld's Switcher program, soon to be distributed free by Apple for the Macintosh 512K, will give you a similar capability.

All these database programs—ranging from graphics storage to text retrieval to the traditional database management—may cause some confusion in the information management market. But in the long run, we'll have more powerful programs and many more ways to manage information. □



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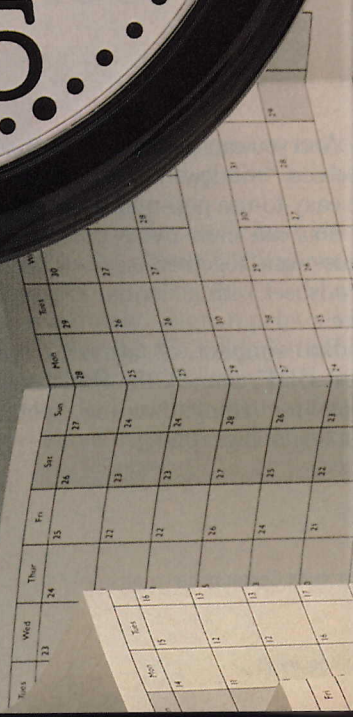
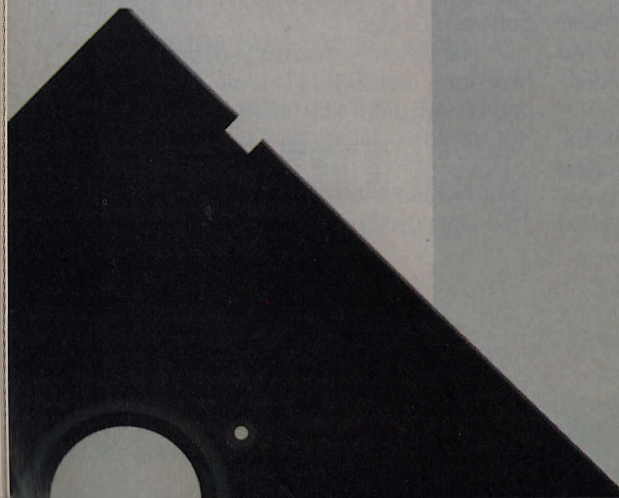
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SPECIAL REPORT

BY JOEL C. DON



E | S | S | O | R | I | E | S

MINI-PROGRAMS THAT WORK WITH YOUR APPLICATIONS WITHOUT GETTING IN THE WAY

PICTURE THE TYPICAL OFFICE desk: a stack of Rolodex cards begging to be filed, appointments in a desk calendar mauled by scores of erasures, scraps of paper with notes, reminders, to-do items, and other scribblings scrambled over every remaining square inch of desk space. In the middle of it all, a pocket calculator doubles as a paperweight. When the phone rings, it's pandemonium—there's nowhere to take a note.

Ironically, this situation has even existed on desks with computers, because while the machine was busy with word processing or spreadsheet calculations it wasn't available for anything else. But as the price of RAM chips fell, computer memories got bigger and bigger, making it possible for software developers to design mini-applications that would use the extra RAM to work alongside your main application program without getting in its way.

Logic demanded that these mini-programs provide the little things you might need while you are in an office working hard on a spreadsheet or a report—things like a place to jot a short note, an on-screen calculator, or a computerized phone book. And so, desk accessories were born.



	MY DESK	POLYWINDOWS DESK	POP-UP DESKSET PLUS	SIDEKICK	THE DESK ORGANIZER	SPOTLIGHT
NOTEPAD						
Print text	N/A	Y	Y	Y	Y	Y
Word wrap	N/A	Y	Y	Y	Y	Y
Move text blocks	N/A	Y	Y	Y	Y	N
ASCII format	N/A	N	Y	Y	Y	Y
Maximum file size	N/A	64K	3500 char.	45K	2500 char.	5500 char.
Import text	N/A	Y	Y	Y	N	N
ROLODEX-TYPE CARD FILE						
Total number of cards or records	15,000	*	N/A	N/A	disk capacity	18,000
Customized cards	Y	Y	N/A	N/A	Y	Y
Search cards	Y	Y	N/A	N/A	Y	Y
Sort cards alphabetically	Y	Y	N/A	N/A	Y	Y
Print cards or mailing labels	Y	Y	N/A	N/A	Y	Y
MONTHLY CALENDAR	Y	Y	Y	Y	Y	Y
APPOINTMENT CALENDAR	Y	Y	N	Y	Y	Y
CLOCK						
Running clock	Y	Y	Y	N/A	Y	Y
Alarm	Y	Y	Y	N/A	Y	Y
CALCULATOR						
Running "paper tape" on screen	N	Y	Y	N	Y	N
Print "paper tape"	Y	Y	Y	N	N	N
Memory constant	Y	N	Y	Y	Y	Y
Export calculations to application	N	Y	Y	Y	N	Y
VOICE COMMUNICATIONS (auto-dial)	Y	Y	Y	Y	Y	Y
MODEM COMMUNICATIONS (databases, bulletin boards)	N	N	Y	N	N	N
EXECUTE DOS COMMANDS	N	N	Y	N	N	Y
CUSTOMIZE WINDOW SIZE	N	Y	N	Y	N	N
CUSTOMIZE WINDOW OR FEATURE LOCATION	N	Y	Y	Y	N	Y
ON-LINE HELP	Y	Y	Y	Y	Y	Y
COPY PROTECTED	Y	Y†	N	Y†	N	Y

*Limited by available RAM

†Unprotected version available

These programs, with names like SideKick and Spotlight and The Desk Organizer, are increasingly popular, and new entries are coming to market all the time. The packages have many similarities and some substantial differences.

Generally, desk accessories remain invisible until you want to use them, hidden on disk or in memory, just a few keystrokes away. As a rule, they operate in windows that overlay your main application. When you call up a desk accessory, you temporarily exit your main program. When you are done, you return to your exact point of departure. The best accessories even let you move information to and from your main application.

Because they are either stored in RAM or must sidle into RAM when in use, accessory programs can bite off a sizable chunk of memory. For

that reason, most desk accessories have been developed for the IBM PC and compatibles with at least 128K bytes of RAM, and there's a steadily growing library for the Macintosh (see "Desk Accessories for the Macintosh" on page 63). Memory limitations make it unlikely that many such programs will be developed for computers with only 64K bytes of RAM.

I looked at six of the most popular desk-accessory programs for MS-DOS computers, comparing them feature for feature. Originally, I thought there would be a clear winner. But after several weeks of examination, no single program soared above the others. Some came close, offering applications to manage just about every office activity. But each program lacked an ingredient or was plagued by some little weakness. All of the features that I'd look for in the ideal desktop organizer already ex-

ist—they just reside on different programs.

The Right Stuff

Choosing the best desk-accessory package for your needs requires an understanding of your work habits. First, determine which features are essential to you. Then match your preferences with the programs. Here are some points to consider:

■ Notepad—Some desk-accessory programs offer full-screen notepads for letters and longer documents. Word-wrap, which automatically moves the words to the next line when you reach the righthand margin, is necessary if you plan to use the notepad to write more than a memo here and there. Editing commands range from bare essentials such as insert and delete to block moves, automatic reformatting, and file merges. Some programs can import text from a main application to

Joel C. Don is a California-based freelance writer specializing in science and medicine.

a notepad screen. That can be especially useful when including portions of a spreadsheet or database program in a letter or other document created on the notepad. If the notepad stores the text in ASCII format, you can edit the notepad files with your favorite word processor.

■ **Card file**—A Rolodex-type card file can take the hassle out of adding new names to your telephone directory and searching for individual cards. This feature varies dramatically from program to program. In some, the "Rolodex" is nothing more than an improvement of the word-processor's find command in a text file. Others are built on simplified relational databases. Most packages allow you to print your card file on paper or continuous-form Rolodex cards.

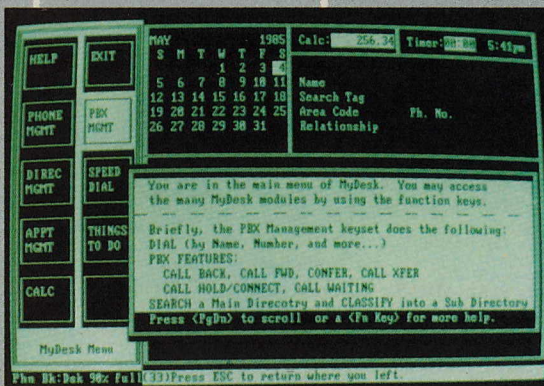
■ **Voice and modem communications**—A couple of the programs offer modem communications with the Rolodex feature so that you can look up the number of an on-line service or database and dial it automatically. Most programs that feature auto-dial for voice or data require a Hayes-compatible modem.

■ **Calendar**—Calendars usually have two levels: monthly, which looks like a wall calendar, and daily, which looks like a page from an appointment book. The monthly calendar is good for looking up dates, past or future. The appointment calendar, of course, is for scheduling. Some appointment calendars are set up for every hour or half hour. If you need appointments at odd times, you'll probably want a calendar that lets you add your own times. Most programs let you print part or all of your daily schedule—essential if you're to be away from the office.

■ **Clock**—An on-line alarm clock that beeps or chimes is a surprisingly welcome desktop aid that I found difficult to give up after trying. If you've ever missed an appointment because you were glued to a troublesome spreadsheet, you'll understand. Some clocks interrupt your application with a preprogrammed message. Some also have snooze alarms that beep 10 minutes after the first alarm.

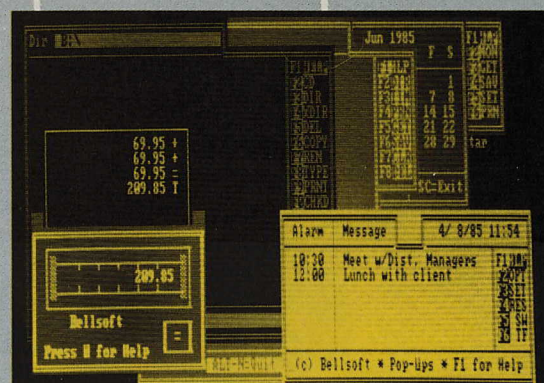
■ **Calculator**—Most calculators use screen graphics to imitate the hand-held variety. Some even simulate a printer tape on-screen and let you print your number-crunching ses-

My Desk, Third Floor Systems, 1630 Oakland Rd., Suite A114, San Jose, CA 95131; (800) 292-3360, (800) 272-3360 (in Calif.); price: \$199 (\$99 My Desk Jr.); minimum memory required: 192K bytes RAM-based/120K bytes disk-based; systems: IBM PC, XT, AT, and compatibles



Polywindows Desk, Polytron, POB 787, Hillsboro, OR 97123; (503) 648-8595, (800) 547-4000 (orders only); price: \$49.95/\$84.95 unprotected; minimum memory required: 128K bytes; systems: IBM PC, XT, AT, and compatibles

Pop-Up DeskSet Plus, Bellsoft, 2820 Northup Way, Bellevue, WA 98004; (206) 828-7282; price: \$129.95 (\$69.95 Pop-Up DeskSet); minimum memory required: 15K bytes (all functions); systems: IBM PC, PCjr, XT, AT, and compatibles



sion for a permanent record. The better calculators can export a calculation from the desk accessory to your main application.

■ **Utilities**—If you've ever needed to format a disk or get a directory of its files without exiting an application (and possibly losing your work), then you'll appreciate the ability to access the variety of DOS commands offered by a few of the programs. You don't have access to all DOS functions, but you can use some

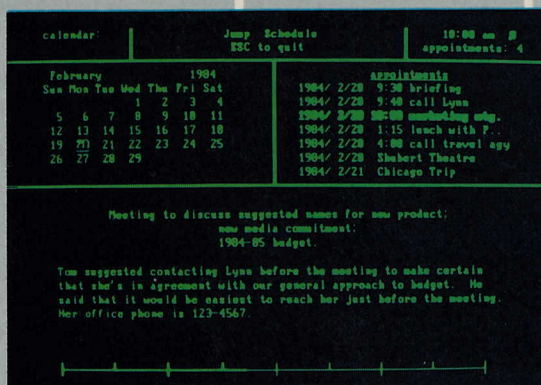
of the common utilities.

■ **Goodies**—Some accessories include handy commands that let you customize screen colors and change the size of the windows or the location of a feature on your screen.

Other Factors

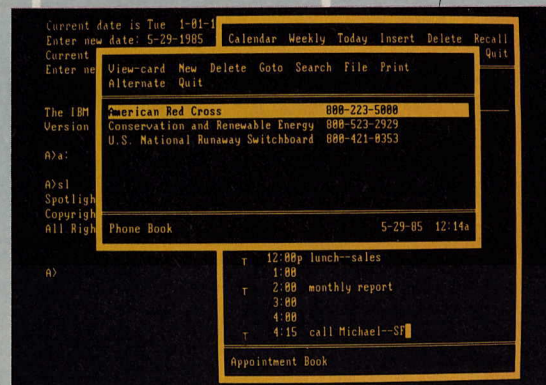
Once you've decided which features you most need, there are other considerations. Foremost among them is compatibility. Desk accessories are designed to stay out of the

SideKick, Borland International Corp., 4113 Scotts Valley Dr., Scotts Valley, CA 95066; (408) 438-8400; price: \$54.95/\$84.95 unprotected; minimum memory required: 64K bytes; systems: IBM PC, XT, AT, PCjr, and compatibles



The Desk Organizer, Warner Software, 666 Fifth Ave., New York, NY 10103; (212) 484-3070; price: \$99; minimum memory required: 170K bytes RAM-based/98K bytes disk-based; systems: IBM PC, XT, AT, PCjr, compatibles and Apple Macintosh

Spotlight, Lotus Development Corp., 55 Cambridge Parkway, Cambridge, MA 02142, (617) 577-8500; price: \$75; minimum memory required: 75K bytes; systems: IBM PC, XT, AT, and compatibles



have the proper disk in your drive in order to load the program on demand. The benefit of disk-based programs is that they load only the accessory application you need, so they use less RAM than packages that load an entire program into RAM. Nonetheless, I prefer the RAM-resident programs. The speed—once you're accustomed to it—is a great advantage.

The Programs

The programs discussed below are the best of the ever-growing pack. Again, all had strengths and weaknesses, and none stood head and shoulders above any other. In addition to these thumbnail evaluations, the table on page 60 offers detailed information on each program.

MY DESK IS AN EASY-to-use program designed to link the power of your computer with a host of telephone features. It comes with its own communications interface card that must be inserted in a peripheral slot in the computer.

My Desk runs either as a disk-based program or, if you have the memory, a RAM-based program. It relies on the IBM's 10 function keys to perform most of its operations. Function keys are depicted on the left side of the screen with labels indicating various operations.

At the heart of My Desk is a sophisticated telephone management system that can tap into most office PBX systems. You can also use the program to take advantage of premium telephone features, including call hold, call forwarding, automatic call back on busy signal, call transferring, conference calling, speed dialing, and call waiting. (My Desk Jr., a trimmed-down version, works with a Hayes-compatible modem but doesn't handle the premium telephone features.) There's also a phone message system for recording times and dates of your calls. Clock watchers will appreciate a function that times phone calls. The time can be automatically logged on your disk for billing records.

In addition to the telephone capabilities, My Desk comes with a sampling of desktop management features, including a well-designed Rolodex-type card file, an alarm

—Continued on page 122

way of your main application, but minor problems frequently occur. Be sure to test the accessory program with the applications you use, just to make certain no conflicts exist. If you use only well-known, popular software, such as WordStar, dBASE III, or Lotus's 1-2-3, you shouldn't have any trouble.

It is with the less popular programs that the conflicts arise, causing one or both programs not to perform as advertised. Conflicts crop up

especially if your main applications use combinations of Alt, Control, Shift, or Esc key sequences to perform commands—the same keys often used to summon the desk accessories. So try before you buy.

Desk-accessory packages come in two flavors—RAM-resident or disk-based. RAM-resident programs load into memory and are instantly accessible. Disk-based programs require disk access, which makes them noticeably slower; you also must

DESK ACCESSORIES

FOR THE MACINTOSH

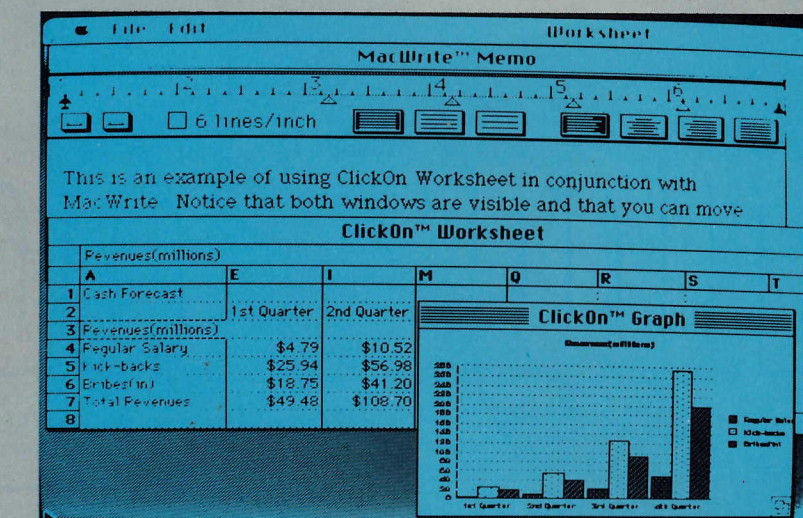
While desk accessories are desirable options on IBM PCs and compatibles, they are standard equipment on Apple's Macintosh. The Mac's menu of stock accessories includes a scrapbook (for moving text between documents), an alarm clock, a notepad, a calculator, and a puzzle. The accessory menu also has utilities that let you tailor the system by setting features like speaker volume, time, and keyboard touch.

But almost since the day the Macintosh was introduced, people have tried to improve upon—or sometimes just change—the standard Macintosh accessories. Much of the work has been done as “freeware”—software that's available free or for a nominal fee on bulletin boards and through user's groups. Hundreds of these programs now exist, including accessories for modem communications, an accessory that mimics a sophisticated Hewlett-Packard business calculator, and one that replaces the Macintosh's icon-oriented Finder with a faster hierarchical directory format.

Programmers have also developed games and silly pastimes that can be stored in the accessory area and run concurrently with your applications. One of my favorites is called Bugs. When this ditty is executed, an exquisitely crafted feisty arthropod marches from the bottom to the top of your screen, reappears at the bottom after he's gone over the top, and continues undaunted until you reboot the system. Pure silliness.

I'm less tolerant of silliness that costs. Take, for example, a couple of accessories in DeskToppers, a \$49.95 program from Harvard Associates (250 Beacon St., Somerville, MA 02143; (617) 492-0660). This program includes a fine datebook calendar and a phone book that is adequate but, with an auto-dialing feature, would be superb. But the program also has two much less useful applications—a doodle pad and an application called Music Maker, which lets you create music by pointing with the mouse at the image of an on-screen musical keyboard. The company says the doodle pad has a real use—it enables you to put drawings into documents. But the Music Maker just doesn't belong.

It wouldn't be so annoying if you could easily omit the doodle pad and



CLICKON WORKSHEET: 20-COLUMN BY 50-ROW SPREADSHEET WITH GRAPHICS.

Music Maker when you put DeskToppers on your application disk, but that isn't the case. To use DeskToppers with an application, you have to copy all four programs to the disk (using 30K bytes of RAM)—and the doodler and piano take up too much of that space. There are freeware programs that will copy the accessories one at a time, but they aren't included in the DeskToppers package.

One of the most useful desk accessory programs for the Macintosh is ClickOn Worksheet, from T/Maker (2115 Landings Dr., Mountain View, CA 94043; (415) 962-0195). This 20-column by 50-row full-function spreadsheet comes with graphics that let you make pie and bar charts from your figures and insert them into MacWrite documents. Installed on another application disk, ClickOn Worksheet uses 35K bytes of disk space. With filled cells, it takes up additional space, and it may occasionally run out of space when used with another application on a 128K Mac.

The \$79.95 package comes with a dozen templates called Worksheet Solutions, which are set up to handle such common activities as depreciation, loan/buy cost comparisons, loan amortization, budgeting, inventory ordering, and investment tracking. To use Solutions, you can either boot the ClickOn master disk or you can use the accessory spreadsheet and place the Solutions files in an external drive.

The most comprehensive accessory program for the Mac is MacDesk, from Intermatrix (5543 Satsuma Ave., North Hollywood, CA 91601; (818) 509-0474). The program was in the final stages of development at this writing, scheduled for summer release. MacDesk, which I saw in a pre-release version, is a stunning package that includes—among more standard desk accessories—terminal emulation, a print spooler that lets you print one document while you're working on another, and a powerful phone log that times incoming and outgoing calls, figures billing, and lets you add notes on subjects discussed.

A sophisticated scheduler includes a daily calendar, a seven-day “Week at a Peek” appointment book, and a daily to-do list. All this is in addition to a memo pad, a calculator with printable tape, an automatic phone dialer, and a print feature that gives you hard-copy Rolodex cards, mailing labels, and phone-book pages.

All of MacDesk's more standard desk accessories can be transferred onto your application disks and selected through the Mac accessory menu. Some advanced functions—like sorting the phone log for billing or reports—require that you use the MacDesk master application, which cannot be moved to other application disks. MacDesk currently sells for \$99.95.

—JONATHAN SACKS

Jonathan Sacks is a West Coast editor of *Popular Computing*.

Image Processing

The
computer
becomes
a copier



PC Eye (above) and MacVision (left) use video cameras to capture images. They're fast and can take shots of three-dimensional objects.



The Datacopy 700 (right), a flatbed scanner, copies a page in about 30 seconds. It's easy to use and produces images of outstanding quality, but it costs more than camera-based devices.



THE TASK OF COPYING has bedeviled humanity throughout history. Scriveners were common

in 19th-century America, as were scribes in ancient Egypt, and we have greeted such inventions as movable type and the office copier with acclamation.

Today it has become feasible to read drawings and text directly into a personal computer. With newly affordable devices, you can even take photos and watch them appear on your monitor in seconds. The technique is called image processing. It's like Xeroxing onto your screen, and it could change the nature of computing significantly.

The uses for image processing are myriad. Business reports, for instance, acquire clarity and grace when accompanied by photos or fine illustrations. Image processors can also spruce up letters, circulars, and other documents. Some believe that in a few years, adorning our prose with pictures will become a matter of course.

Pictures are already being used to heighten the applicability of databases in a variety of fields. Realtors add photos to computerized listings of homes. An Atlanta company puts dress patterns on file. A Texas state agency catalogs cattle brands. In Hollywood, a casting director has compiled an image database of members of the Screen Actors Guild. As roles become available, he calls up all actors who match them physically. Security agents at limited-access areas check photos of individuals seeking entry. Financial institutions verify signatures. And doctors can store patient histories together with X-rays, cell slides, photos of external condition, and other diagnostic evidence. Law-enforcement, insurance, and advertising operations also make use of images in databases.

The image processor has further potential, for not only can you copy the pictures, but after they've been digitized, you can alter them. This capacity offers exciting opportunities in computer-aided design. Architects, for instance, feed drawings into the computer and rework them there. Small graphic-design firms photograph objects onto the screen for immediate touch-up.

The device also has scientific uses. A professor in Boston connects an image processor to an electron



The LaserFAX produces high-quality images.

microscope to study the microstructure of metals. A biologist at UC Berkeley employs one to measure leaves more precisely by counting the pixels on the screen.

The image processor can also read in forms, a welcome feat indeed. Forms have long been an irritation to computer users, since they have generally demanded that you feed the form into the printer, then try to match on-screen prose to its blanks. With the form in memory, the problem evanesces.

And inexpensive devices that read only text—optical character recognizers, or OCRs—open more vistas. The OCR can eliminate the rocks-to-the-pyramid experience of typing lots of words into a database. It can benefit people like lawyers who must deal regularly with somewhat repetitive material such as standard contracts or court pleadings.

The main limitation image processors now face is the need for storage. Even a low-resolution screen image can take up 32K bytes, and a detailed image may require 256K or more. Data compression can partly solve this problem but may also diminish picture quality. Thus, if you wish to do much digital copying, you may find a hard disk very handy.

Image processors can best be categorized according to the means by which they capture the visual image. Though other variables, such as software and equipment capability, are important, the method of image capture is not only the most visible difference among the devices, but the most critical, since it largely determines the speed, quality, and ease of use.

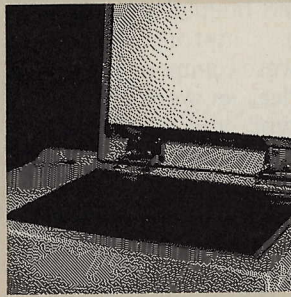
Among picture processors, there are currently three main types of input devices, in rising order of cost: cartridges, video cameras, and flatbed scanners. Among the OCRs, there are manual scanners and flatbed scanners.

Let's look at the picture processors first. Most of these can assimilate text as well—text, of course, can be photographed—but they can-

**By
Dan
McNeill**

Dan McNeill is coauthor of *The Apple IIc: Your First Computer* from Computer Publications (1985).

The Basics of Image Processing



Before now, without extremely expensive machines, copying pictures into a personal computer has not been easy. It has required such efforts as tracing the picture with a digitizing pen—a tedious enterprise at best. Image processing now makes it simple. But the technology itself is not so simple, and it is worth a separate overview.

The procedure involves at least three steps: (1) sensing the image, that is, converting it into a string of analog or wave-like electrical signals; (2) translating the analog signals into digital ones, that is, numbers; and (3) transforming the digital data into pictures.

The first step requires either an optical scanner, such as the ThunderScan cartridge and flatbed scanners, or a video camera. Optical scanners send a tiny beam of light toward the document and register the amount of reflection that returns. They can work in the dark. Video cameras record light generated by other sources and for best results usually need well-placed lamps.

In step two, the analog waves are sampled at regular intervals and given numbers. The pulse at one sampling point may translate into 7, the next into 8, the next into 2, and so on. These integers usually indicate how gray or what color the corresponding pixel ("picture element") will be. Thus, the subtlety of gray-scale or the variety of colors you can have depends on the number of different integers a pulse can translate into. This factor in turn derives from the number of bits assigned to each pixel. The standard Apple II and IBM PC have 4 bits per pixel, and since 4 bits can express 16 integers, you can have 16 different grays or colors. If you add sophisticated video boards to the computer, you can get 8 bits per pixel, or 256 grays or colors. Some hardware allows each bit of color to act as a key to further gradations for even more color choices.

Image digitization works a bit differently in the Macintosh, where pixels are either black or white, as shown in the ThunderScan image

above. To render gray, Macintosh image processors scatter black pixels through a white field, according to an assortment of density patterns. The software analyzes the overall picture and chooses the patterns. Thus, a product like MacVision uses 8 bits per pixel even though it would need only one to determine whether a pixel were black or white.

After an image is captured and digitized, the third step is display. The cathode-ray gun in your monitor fires an electron beam at the phosphor-coated screen, and its pixels light up according to the intensity of the beam. The integer given to each pixel determines this intensity. The more bits-per-pixel you have, and the more pixels-per-inch, the closer the digitized picture will resemble the original. These factors make up resolution, the sharpness of the picture. For a black-and-white image comparable to those on a television screen, you generally need a 512- by 512-pixel grid with 128 gray levels. A minimum system for image processing should display 256 by 256 pixels with 64 gray levels.

Image processing demands abundant memory for processing and storage. A 256 by 256 black-and-white picture with 16 gray levels takes up 32K bytes. A picture of the same resolution with 64 gray levels—our recommended minimum—needs 64K. A 512 by 512 image with 256 levels requires 256K, about two-thirds of a standard IBM PC floppy disk. Color multiplies the requirements still further. It's easy to see why a machine like the LaserFAX SpectraScan 200, which records color at 200 dots per inch, might need a hard disk with an IBM PC. It's also easy to see why the makers of image processors are eagerly awaiting the arrival of laser-discs in the mass market, for these devices will make it possible for anyone to have an image database.

—BARBARA ROBERTSON

Barbara Robertson is a Mill Valley, California-based journalist.

not decipher it and convert it to ASCII code, so you cannot manipulate it.

Affordable Imaging

The least expensive image processor now available is the ThunderScan cartridge by Thunderware (21 Orinda Way, Orinda, CA 94563; (415) 652-1737). ThunderScan works with the Macintosh. It simply plugs into the Imagewriter printer where the ribbon cartridge normally goes. You roll the original document under the platen, and ThunderScan directs a light beam at it. A sensor determines the amount of gray in each scanned area on a scale of 1 to 32 and relays this information to the computer. Since the Macintosh's individual pixels cannot render gray, they simulate it with patterns of black and white (see "The Basics of Image Processing" at left). The software analyzes the incoming signals and selects the appropriate patterns. An image then appears on your screen, and you can alter it at will. ThunderScan comes complete with software for an affordable \$229.

ThunderScan has many advantages besides its price. Its line-feeder input is easy to use. You simply insert the document and the printer takes over, inching it through. Moreover, ThunderScan creates images with very good resolution—200 dots per inch—better than that of most video cameras. Since it works inside the Imagewriter, ThunderScan takes up no extra space on the desk, other than that occupied by its small switch box. And its software, written by Mac cocreator Andy Hertzfeld, is excellent.

The software lets you change contrast, patterns, and brightness after scanning as well as before, so you don't have to rescan if you want a brighter image. It allows you to play with the image as MacPaint does, but with some added features. For instance, you can use the hand icon to move the completed image around the screen like a puck on ice. If you wish, you can save the picture as a MacPaint document and use its somewhat different tools to retouch it.

ThunderScan does have drawbacks, and the most serious is speed. It can take up to 15 minutes to read

—Continued on page 124



IT'S THE BEST WAY TO CHOOSE BETWEEN SEEMINGLY SUITABLE BUSINESS PROGRAMS

BY TAN A. SUMMERS

BUYING THE WRONG SOFTWARE carries a heavy price: wasted money, wasted time, and aggravation—not to mention the embarrassment of admitting that you bought a dud or a program that doesn't fit your specific needs or work habits.

Of course, the best way to avoid buying software that completely misses the mark is to follow the conventional rules: analyze your needs, talk to colleagues and friends about the software they use, and read the reviews. Software reviews tell you for whom the program is intended, what its capabilities are, how well it works, and whether you should consider buying it. They also tell you how to contact the manufacturer should you require additional information regarding any special requirements you expect a program to accommodate.

But sometimes talking to others and reading reviews aren't enough. Say you've narrowed your choices to two or three programs that, by all accounts, have the basic features you

need. How do you decide which one suits you best? The only way is to test-drive it yourself. Get into the program and see how it feels. Check its acceleration, its handling in the curves, its braking in emergencies. Just as you wouldn't buy a new car until you took it for a test drive, you shouldn't buy a program without taking its disk for a spin.

While you usually can't expect to borrow a software package from a computer store for a week's worth of exhaustive testing, you can put a program through some simple tests as you shop. The procedures presented here will help you test four types of full-featured business applications software: word-processing, spreadsheet, file-management, and graphics programs.

WORD-PROCESSING PROGRAMS

1 *Typing Speed:* Begin by entering a paragraph or so of text as fast as you can type. If you're not a fast typist, type nonsense words interspersed with spaces. Letters should appear on the screen as fast as you type them. When you reach the right margin, words should wrap around to the next line without lagging behind your typing. If you can get ahead of a word processor during normal text entry, it's not adequate.

2 *Copying Text:* Duplicate the block of text you've typed. Find the appropriate commands and place the cursor at the top of the text, mark it, move the cursor to the bottom of the text and place another mark, then copy the block. Note how easy or difficult the process is and repeat it several times until you have plenty of text to work with, say, two or three pages worth. Also make sure the program doesn't balk at copying a page or two at a time or at moving a block that straddles a page break.

3 *Cursor Control:* Test how easy it is to move around within the document using the cursor control keys or a mouse. Scroll up and down through the text, one screen or page at a time. There should be a single command to move the cursor to the top or bottom of the file. The program should jump from top to bottom of a two-page file quickly without scrolling the entire file across the screen.

4 *Text Editing:* Try editing the text you've entered. The commands for doing so should be flexible and convenient. Notice whether you can stay in the same mode for writing and editing. A program that requires you to constantly switch modes can be annoying.

5 *Text Formatting:* Try changing the margins and double- or triple-spacing the text. Use different formats: justified right and left, ragged left, centered. These procedures should not be complicated.

6 *Automatic Reformatting:* See if the program automatically reformats paragraphs whenever you delete a few words or set new margins. Doing it manually can be a laborious process. At the same time, make sure that different paragraphs in your sample text can have different margin settings.

7 *Margin Settings:* See how far the right margin can go. If it goes off the screen, the program should be able to scroll sideways so that you can view all of the text.

8 *Search and Replace:* Return to the top of your text and try the search-and-replace command: replace all occurrences of the word "the" with asterisks, for example. Does replacing "the" also affect "there"? You should have the option to replace whole words or parts of words. Experiment with search options, including global search, in which the program should automatically move to the next occurrence of the word without requiring a second command.

9 *Type Styles:* Try marking the text for boldface, italic, or underlined. It should be simple. Make sure the program can handle sub- or superscripts if you need those capabilities.

10 *Printer Compatibility:* Make sure that the program has a built-in driver for your brand of printer and that it can take advantage of all your printer's features.

11 *Saving Text:* Does the program automatically save text files before you quit or prompt you to do it? The program should remind you to save the file but give you the option of exiting without saving. If it doesn't do both, you will more than likely have accidents when using the program.

12 *Data Format:* Try creating an ASCII file. The procedure should be simple if you plan to transmit files or use documents on more than one computer.

Designed to give you a rough idea of a program's operation, these procedures are not all that time-consuming. You can easily run through the tests for each type of program in an hour or less while you're in a computer store.

Where to Test

Find a computer store that specializes in software or at least has a good selection of programs. Don't waste time with a store that sells primarily hardware and stocks only demos of the current best-selling software.

It's a good idea to pick a store you like and stick with it. Although dealers are willing to let customers try whatever software is on hand, most are reluctant to open expensive new software packages, especially for one-time browsers. Dealers are

more likely to give preferred treatment to regular customers. Also, when the software is too complex for a thorough in-store review, dealers are sometimes willing to let regular customers take the manual for a few days to get a better feel for the program's personality or even take the software to the office for more thorough testing.

In any case, make an appointment before coming in to review the software. That way you can reserve a period during a quiet time of day, and a salesperson can be better prepared to get you started and answer your questions. Make sure ahead of time that the store can provide hardware similar to yours. If you have a hard disk, you'll want to try out programs on a system with a hard disk.

Finally, be ethical when dealing with the computer store and you'll get better service in the long run. Don't test software at one store and then buy at another to save a few

dollars, and don't expect to test half a dozen packages at one sitting. Remember, however, that you're not obliged to buy a package that doesn't meet your expectations simply because you were able to see a demonstration or try out a program yourself.

Getting Started

We'll assume that you've done your homework and have narrowed the field to two or three programs. Here are some general tips that apply to testing any type of application program.

First, in preparation for the in-store tests, arm yourself with some actual data—financial figures, names and addresses, business letters, whatever applies to the type of program you'll be testing—that you can enter into programs. It's easier to enter real data in a hurry than it is to fabricate it.

When you sit down to test a program, try to get an overall feel for

Tan A. Summers frequently reviews software for *Popular Computing* and is the author of *The Small Business Guidebook to PC Compatibles*, to be published by Scott, Foresman later this year.

SPREADSHEET PROGRAMS

1 Spreadsheet Setup: Construct a small worksheet with titles, numeric data, and formulas to see how easy it is to enter data. Your sample might look something like the figure; cells B8, C8, and D8 contain a simple formula to subtract row 6 from row 5. See if you can enter formulas by moving the cursor to the desired cell as well as by entering the cell address.

	A	B	C	D
1 (MicroCalc)				
2				
3 Year:		1984	1985	1986
4				
5 Sales:		45000.00	50000.00	60000.00
6 Costs:		30000.00	35000.00	40000.00
7				
8 Income:		15000.00	15000.00	20000.00

2 Editing Cells: Move to a cell with a formula in it and change the formula. Start a command, then change your mind and "back out." Both editing and original entry procedures should be simple to use.

3 On-Screen Help: As you work, invoke a help screen from time to time to evaluate whether it relates to your position in the program and helps you with potential problems.

4 Cursor Movement: Move the cursor as far as it will go to the bottom and right, then come back. This shows you how quickly you can move around the worksheet. The program should let you scroll easily in all four directions and have a "home" command that quickly returns you to the top left of the model or to a location you specify.

5 Standard Features: As you walk through each menu to see what's available, try some of the features. Insert, delete, and copy rows, columns, and a range of cells.

6 Cell Formatting: Format a row, a column, and a group of cells. Find out how wide a column can be and whether each column's width is independent of others. The program should give you plenty of formatting choices, such as centered versus left- or right-justified data, and various numeric formats including dollars and scientific notation.

7 Windowing: If the program uses windows, open the maximum number available and try scrolling within each one. You should be able to move the cursor around within each window independently.

8 Graphics: If the program has graphics capabilities, create a graph, using data from your sample spreadsheet. Print the chart. Are you satisfied with the appearance of the finished product? If not, you'll need to purchase a separate graphics package to enhance the output.

9 Printing Features: Try printing your worksheet. It's helpful if the program can print negative numbers in parentheses. Check to see if the program can instruct the printer to use compressed mode in order to get more columns onto one sheet of paper. See if the program automatically divides the output into pages and if you can also define manually where the page breaks will fall. Can the program print just what you see on the screen for those instances where you need to print only a portion of the sheet?

10 Calculation Speed: To test the program's overall calculation speed, it's best to use a large sample file with interrelated, complex formulas. If you don't have a large file on hand to recalculate, ask the dealer for a sample file. To test, turn off the program's automatic calculation mode, change a key figure near the top of the sheet, then issue the recalculate command to see how long the program takes to recalculate the figures.

11 Special Options: Check the documentation for less easily tested features. For example, the list of preprogrammed functions should include mathematical formulas that you can use to sum and average ranges of cells, work with dates, accurately round numbers, and perform other tasks difficult to program into worksheet cells. See if you can link models and if the program creates DIF (data interchange format) files that let it exchange information with other programs.

it. If the program has menus, browse through them all to see what the choices are and how easy they are to understand. If the program is command-driven, try out several commands to see if they make sense and are easy to learn and uncomplicated to use.

As you begin entering data and working with the program, check out its basic operation. Notice whether prompts, help screens, and error messages are consistent and easy to understand. See if the program takes advantage of your computer's function keys and if you can reprogram them yourself. Try undoing commands to see if editing and error recovery are easy.

If you plan to use the application program with desk management or other concurrent software, test them together to see if the program's operation is affected.

Look at the accompanying documentation. It should have a thorough index, a complete technical reference and command summary, and a tutorial either as part of the manual or on disk. Watch out for poorly written, overly technical manuals. Sometimes the products they describe are designed for programmers rather than general business users with an intermediate level of expertise.

Alas, not all types of programs lend themselves to quick tests. Most integrated programs, for example, are too complex to test thoroughly while you're in a store. If you are not permitted to borrow the software, you can at least check how smoothly you can move from one application to another and see how easily you can share information between them. You also can put each portion of the program through the more

basic of the tests discussed here.

Communications software is also tough to test. Sometimes you can't even look at menus in a communications program without having a modem connected and on-line. And don't attempt to test accounting software at a store. You need to be able to set up trial accounts, enter realistic data, and try out the package's reports before you can begin to get to know accounting software on a personal basis.

But for the four major types of applications packages, the step-by-step procedures outlined in the accompanying text boxes should help you with the subjective part of your decision-making process. As you put each program through its paces, follow your instincts. No program was designed to suit everybody's work habits. Only you will know which one feels right to you.

FILE-MANAGEMENT PROGRAMS

1 *Creating Forms:* Set up a simple name and address file to see how you define fields as text, numeric, date, formula, and so on. Are you comfortable creating the forms or does the procedure seem awkward? Does the program prompt you for the next step? Too much prompting may slow down the program's operation; too little may leave you spending more time with the manual than with your data-management needs.

2 *Data Entry:* Enter several names and addresses. The program should automatically move the cursor to the next field. You should also be able to move backward to correct mistakes.

3 *Locating Data:* Once you've entered some data, try casually searching through it for a particular record. If the program requires that you designate certain fields as search keys while you're creating the form, it should allow as many keys as you'll need. Sometimes, for instance, you might want to search by an individual's name; other times, you may need to search by a company name. Try to browse through the files as you would through a card file.

4 *Editing Files:* Save the file, then open it again and delete and add some records. This happens so much in the course of a day's work that the procedure should be as simple as possible.

5 *Editing Forms:* Try editing the form itself after you've entered some data. You should be able to add new fields without disturbing data you've already entered. The software should protect you against accidental deletion either of data fields or of data itself by asking you to confirm a delete command.

6 *Error Handling:* Try to exit the program without saving. Does the program catch your mistake and remind you to save? If not, chances are that you'll lose data with this program at one time or another.

7 *Sorting Functions:* Try a simple sort and send the report to the screen, a printer, and a disk. The program should let you determine which field within a record will be the index key when sorting. You should be able to determine several sorting levels for the report so that if three employees are named Smith, for instance, the program will list the three alphabetically by first name as well.

8 *Search Functions:* Try out the search function including logical searches, which let you request that a report consist of this record AND that record, or all records NOT in a certain category. Also try partial searches, in which the program will look for a word or phrase within any field, so you can find customer John Friedman's record even if you can't remember whether his name is Friedman, Fried, or Frieden-stein.

9 *Search and Sort Speed:* Find out if the dealer has a large sample file you can use to test how fast a program searches and sorts during the report procedure. If no large file is available, a short file will suffice: if you get bored waiting for the program to search and sort a short file, you can assume that the program is too slow for you.

10 *Printing Functions:* Design a simple tabular report and print it. This exercise will let you see how the reports will actually look, since the on-screen versions are usually quite different from printouts of the same report.

11 *Report Formats:* Check the documentation for a complete list of available report formats. Can the program produce the types of reports you need? Are the reports limited only to lists of the data you've entered? Can the program provide calculated fields? Find out how wide reports can be and whether the software supports special print modes such as condensed characters. If the report formats seem too limited, ask if a separate reporting module is available.

GRAPHICS PROGRAMS

1 *Creating Graphs:* Start right in by creating a graph to see whether the software uses menus or direct commands. Menus are preferable if you use the software infrequently enough that you're likely to forget program commands between sessions. Unless menus are well done, though, they'll slow you down if you use the program frequently.

2 *Input Methods:* You should be able to produce correctly proportioned graphs just by entering the numbers to be compared. If the program requires an input device other than the keyboard, you shouldn't have to switch constantly between an alternate device and the keyboard.

3 *Editing Graphs:* Try changing the information displayed in the graph. Is editing or updating easy? Does the graph automatically reform, or must you instruct the program to recalculate the graph each time?

4 *Types of Graphs:* Try producing several kinds of graphs—such as bar, line, and pie charts—to evaluate the variety and speed with which they can be created. See if you can superimpose one graph on another or display several charts on the screen at one time.

5 *Label Types:* Be sure to try out different labels to see what font styles are available. You should have several sizes and styles on hand for variety and for differentiating between titles and other labels. Notice whether the program

helps format the graph by keeping titles centered.

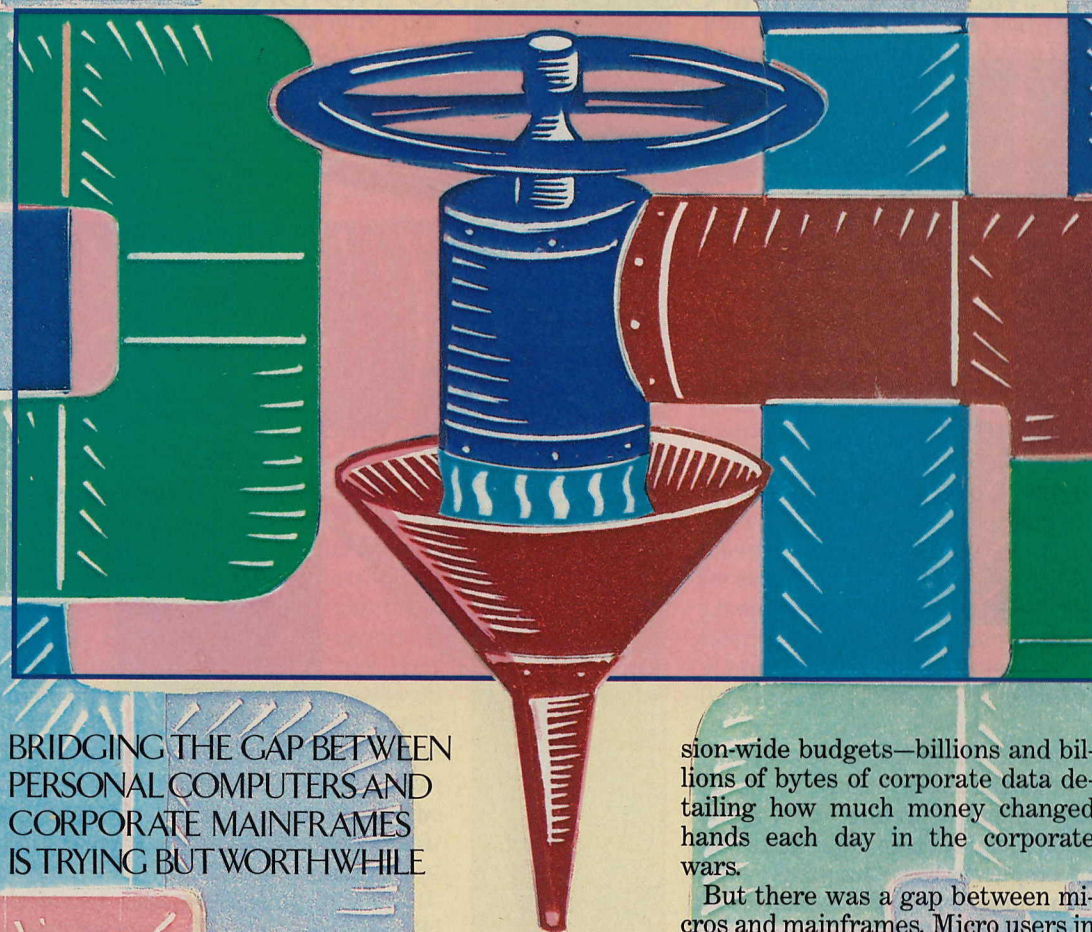
6 *Freehand Art:* If the program offers freehand and enhancing modes, try sprucing up a graph or creating a logo or illustration to see how useful these features are. Also ask yourself whether the final result is presentation quality. Consider whether you'll be printing charts or displaying them on the screen or as slides photographed from the screen.

7 *Printing and Plotting:* If you need hard copy, make sure the program supports the printer or plotter you'll be using. Get an output of a sample chart on a printer or plotter similar to yours. Does the program let you specify the colors that will be used either on-screen or as sent to the printer or plotter? If not, are the colors the program uses attractive?

8 *Slide Shows:* Find out if the program provides a "slide show" option for displaying finished graphs during a presentation. If so, try the demonstration program usually included on the disk.

9 *Transferring Graphs:* You'll probably need to turn to the documentation to ascertain the program's ability to create a graph from imported information. The program should accept DIF files or operate on files made by other programs you own or plan to buy. See if finished graphs can be transmitted by telephone and reconstructed by the recipient. □

MICRO-TO-MAINFRAME LINKS



BRIDGING THE GAP BETWEEN
PERSONAL COMPUTERS AND
CORPORATE MAINFRAMES
IS TRYING BUT WORTHWHILE

BY ARIELLE EMMETT

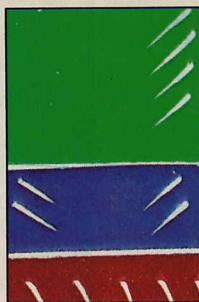
BY THE EARLY 1980s, WE ALL became aware of the separate advantages of microcomputers and mainframes. Micros gave us, at last, the power to compute on our own; they combined analytic skill, flexible software, and fast response time in one easy-to-use package. Mainframes held all the information that really counted: banking transactions, manufacturing inventory, departmental and divi-

sion-wide budgets—billions and billions of bytes of corporate data detailing how much money changed hands each day in the corporate wars.

But there was a gap between micros and mainframes. Micro users in large companies needed to get at "live" (current) mainframe data, extract only what they needed, and download it to their personal computers where they could analyze it with their micro-based applications and report-writing tools. Mainframes, too, had problems. Despite their enormous capacity for data storage, they sometimes were overburdened and could profitably dump some of their processing tasks on micros.

A link—a marriage of advantages

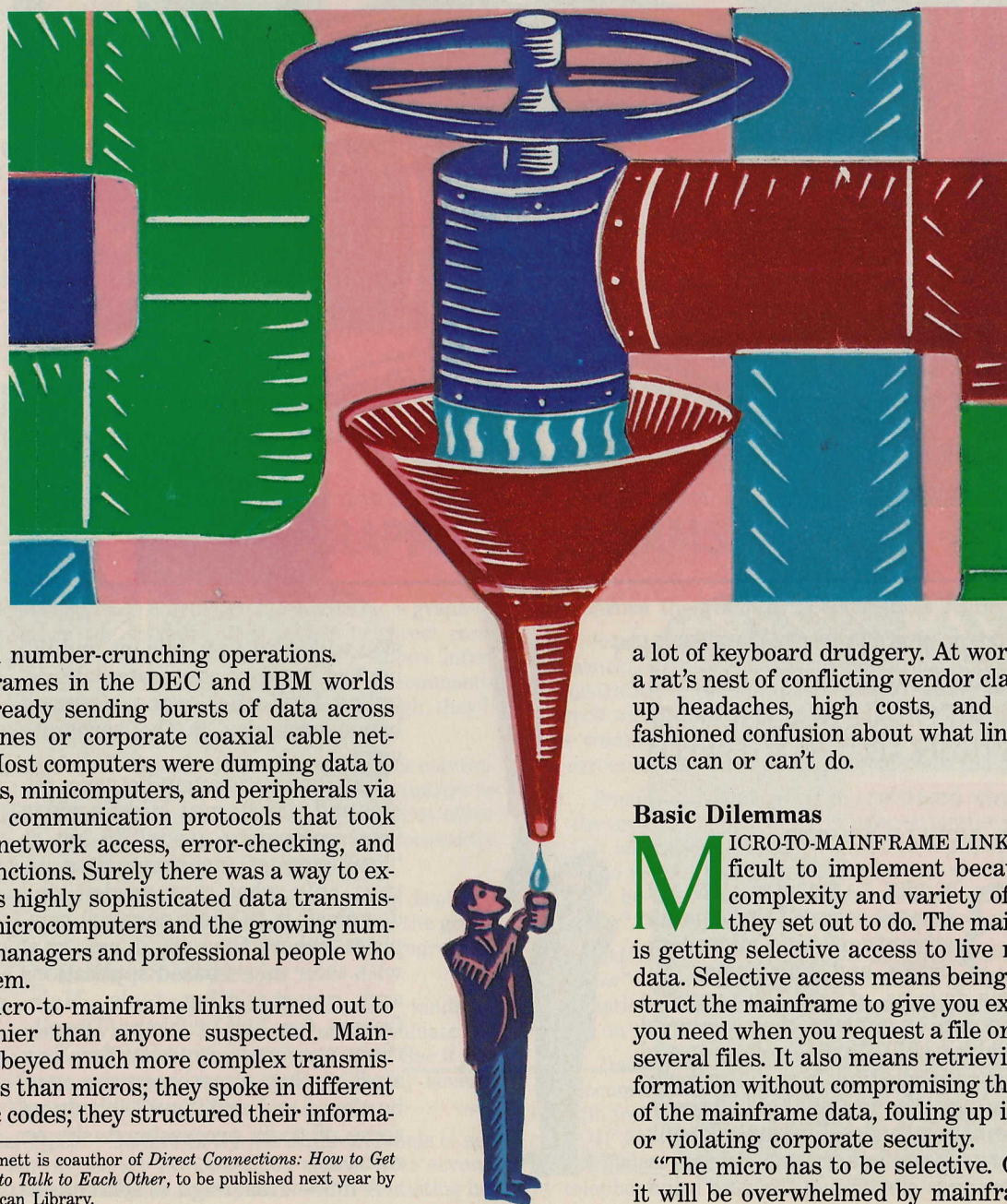
—was needed. With the proper connection, the mainframe could act as a central hub, a storage vault for files that micros could access and share. Electronic mail could fly between users. Databases, programs, and processing chores could be shared by dissimilar machines. Micros could also act as data storage devices that would be “polled” (called up) by a mainframe, which would automatically collect data for use in billing, budget reviews, and other kinds of



tion differently. They could be outfitted to shake hands with micros—to physically connect with them—but they couldn't easily do much more than that.

Today, micro-to-mainframe links are still among the most perplexing problems and sought-after innovations in communications technology. At best, these links offer the potential of shared processing power, relief to overburdened mainframes, and a way out of

PERPLEXING AND HIGHLY SOUGHT-AFTER, MICRO-TO-MAINFRAME LINKS OFFER THE POTENTIAL OF SHARED PROCESSING POWER, RELIEF TO OVERBURDENED MAINFRAMES, AND A WAY OUT OF KEYBOARD DRUDGERY.



essential number-crunching operations.

Mainframes in the DEC and IBM worlds were already sending bursts of data across phone lines or corporate coaxial cable networks. Host computers were dumping data to terminals, minicomputers, and peripherals via complex communication protocols that took care of network access, error-checking, and other functions. Surely there was a way to extend this highly sophisticated data transmission to microcomputers and the growing numbers of managers and professional people who used them.

But micro-to-mainframe links turned out to be thornier than anyone suspected. Mainframes obeyed much more complex transmission rules than micros; they spoke in different symbolic codes; they structured their informa-

a lot of keyboard drudgery. At worst, they're a rat's nest of conflicting vendor claims, start-up headaches, high costs, and plain old-fashioned confusion about what linking products can or can't do.

Basic Dilemmas

MICRO-TO-MAINFRAME LINKS ARE DIFFICULT to implement because of the complexity and variety of the tasks they set out to do. The main dilemma is getting selective access to live mainframe data. Selective access means being able to instruct the mainframe to give you exactly what you need when you request a file or data from several files. It also means retrieving that information without compromising the integrity of the mainframe data, fouling up its records, or violating corporate security.

“The micro has to be selective. Otherwise, it will be overwhelmed by mainframe data,”

Arielle Emmett is coauthor of *Direct Connections: How to Get Computers to Talk to Each Other*, to be published next year by New American Library.

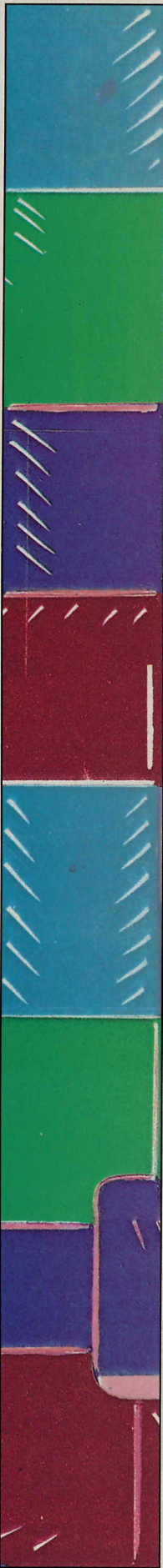
explains Thomas O'Flaherty, from Information Service Strategies, a consulting group in Wood-Ridge, New Jersey. "Instead of dealing with megabytes on a hard disk, you're dealing with gigabytes in a single mainframe file."

Once you access a particular mainframe file, you then have to be able to move the data to your personal computer and convert it into a format your microcomputer application program can use. Mainframe applications use different file structures than micro applications, and an efficient link must enable these unlike structures to share information. For example, if you want to transport files from a mainframe and load them into dBASE II, the information must be compatible with dBASE II's input format. By the same token, if you move data from a mainframe to your personal computer for analysis with 1-2-3, you must make sure your spreadsheet knows exactly how to put the figures and categories of information into the proper cells.

There's another element to consider before you can link your personal computer to a mainframe. Micros have to recognize and run with mainframe communications standards. The emerging de facto standard for mainframe communications is IBM's Systems Network Architecture (SNA), a set of protocols that defines how IBM products interact with each other. Terminals hooked to IBM hosts under the SNA scheme can work interactively with mainframe application programs. Micros that are to be linked to mainframes using SNA must conform to the same protocols.

Consequently, there's much concern about what IBM will do next. Of particularly keen interest today is an SNA building block called Logical Unit (LU) 6.2. The unit is the basis of what IBM calls Advanced Program-to-Program Communication, which is how IBM mainframes, minicomputers, and micros will eventually talk to each other. Under LU 6.2, micro and mainframe programs can exchange data in such a fashion that one program can do specialized work while the other directs the work, or two peer programs can share data. Some people see LU 6.2 as the beginning of true distributed data processing in a multi-computer environment. IBM has yet to extend the implementation of LU 6.2 to its own PC, though plans are in the works.

At present, though, the state of the art in micro-to-mainframe links is in flux. Vendors haven't settled on link standards, much less easy-to-use strategies. They are dealing with massive technical constraints—the most salient being the wide variety of mainframe file structures and the lack of adequate data security procedures to protect new data that you and other micro users might transfer to a mainframe. And vendors are still not sure just where to place their products in a market that hangs on every promise IBM makes.



A Variety of Approaches

THIS UNCERTAINTY IN THE MARKET place means that you should consider carefully what kinds of information you want access to and how you want to use it. Moreover, micro-to-mainframe links can cost tens to hundreds of thousands of dollars. Before making or recommending such an expenditure, you'd be wise to learn all you can about link terminology and the pros and cons of the different types of links.

The term "link" refers to a variety of devices. A link can mean just a simple physical connection—the wire, cable, or dial-up phone line that attaches your personal computer to a mainframe. "Link" can also refer to a terminal emulator—a circuit board that lets you connect your personal computer to a phone line or coaxial network and then mimic the characteristics of a mainframe-linked terminal. A third type of "link" is a protocol converter—a device that lets personal computers switch from slow, asynchronous communications (their normal mode) to the ultra-fast, precisely timed synchronous communications that mainframes use.

Micro-to-mainframe links also include different types of software. First, there are software packages called application interface links. These higher-level links let personal computers download and manipulate data from certain application programs used by mainframes. A second category is database interface links, which give micros access to mainframe databases. The more sophisticated database interface links read a wide variety of mainframe database files and convert data into formats compatible with Lotus's 1-2-3, Symphony, dBASE II, VisiCalc, and other popular micro analysis tools. Each type of link—from simple dial-up phone lines to powerful database interface links—has tradeoffs.

Low-Level Links

PHYSICAL LINKS, EITHER ASYNCHRONOUS or synchronous, are the lowest level of micro-to-mainframe links. In simple terms, you either get a mainframe to start communicating asynchronously (like a micro) or you make your personal computer "act dumb"—that is, mimic the qualities of a terminal, a monitor that displays screens of information imported from a mainframe.

With asynchronous links, mainframes are forced to obey the same communication rules that micros operate under. For this type of link a mainframe is outfitted with software that converts its internal code (all IBM mainframes, for example, use EBCDIC, short for Extended Binary-Coded Decimal Interchange Code) into the standard ASCII code that micros use. To complete the link, you attach any asynchronous, Bell-compatible modem to a serial port

—Continued on page 126

POPULAR

YOUR GUIDE TO GENUINELY USEFUL COMPUTER
SYSTEMS, PERIPHERALS, SOFTWARE, AND BOOKS

REVIEWS

Hardware

The choice of microcomputers for serious applications has never been greater, and this month's reviews highlight systems from three major categories. The first is the long-awaited **AT&T Unix PC**.

But our review of that system includes a few surprises. First, the new AT&T machine's operating environment makes Unix easy for anyone to use—and that's no small accomplishment. The second surprise is a disappointment: performance is somewhat less than expected.

Nonetheless, as an integrated package, the Unix PC is a solid business computer. And with its ability to run sophisticated minicomputer software with Unix, AT&T's Unix PC may be the right computer for many business applications.

On a smaller scale, we review the **Osborne Vixen**, Osborne's first product in the U.S. since the company emerged from Chapter 11 proceedings. Its new transportable CP/M-based Vixen just might put Osborne back on the track of success.



Osborne's Vixen.

This month we also take a look at Tandy's low-cost alternative to the IBM PC XT, and at \$2000 the highly compatible **Tandy 1200 HD** is well worth your consideration.

—DENNIS ALLEN



Unix is easy on the AT&T Unix PC.

Ability for the IBM PC.



Ability, from Xanaro Technologies, is the newest entrant for the IBM PC. The company's extensive ad campaign, which preceded the release of the product by at least half a year, promised nearly everything you could want in such a program. But, as our in-depth review indicates, Ability lives up to its manufacturer's claims to varying degrees.

After rigorous tests, what our reviewers found out could save potential users some frustration.

Other reviews focus on **PFS:Access**, **Time Line**, and **FactFinder**.

—BEVERLY CRONIN

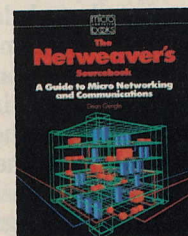
Software

The promise of integrated software tantalizes business users—all functions in one package, common data structure, and easy transfer of data from application to application.

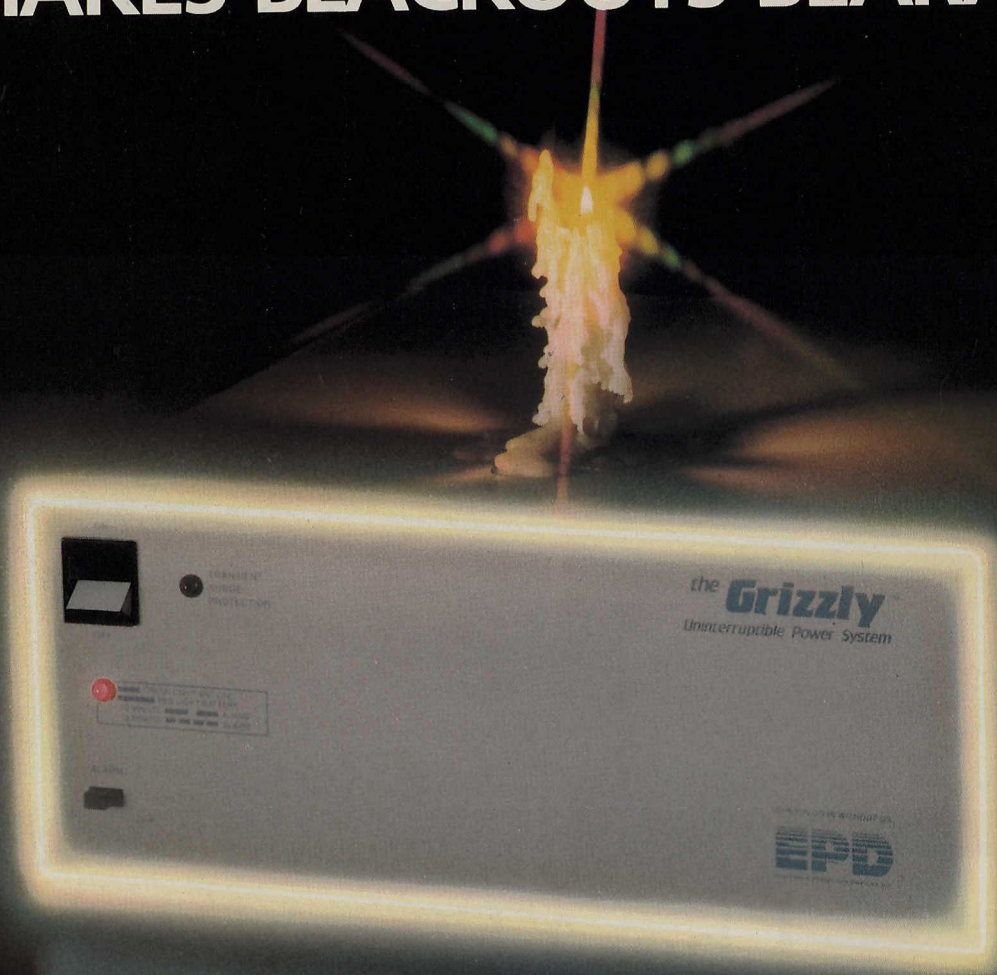
Books

Microcomputer technology has two distinct dimensions—the practical, hands-on mechanics and the social and cultural implications—and rarely does a book on the subject manage to address both. One exception is the focus of our lead review, Dean Gengle's **The Netweaver's Sourcebook**. And in **Micro Reviews**, we look at volumes on information systems, data communications, and microcomputer/typesetter interfaces.

—TOM MCMILLAN



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The AT&T Unix PC

*This new personal computer is a business machine
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AT&T is setting out to win the personal computer game, and with its new Unix PC (also known as the Model 7300), the company just might succeed. As a computer for the modern office, AT&T's new machine is impressive. It is easy to learn and use, and it has the best user interface I've seen yet for business applications.

The Unix PC is based on a Motorola 68010 microprocessor, a more powerful version of the popular 68000. At \$5590, the system includes a monochrome monitor, 512K bytes of RAM, one floppy-disk drive and one 10-megabyte hard-disk drive, and a built-in 1200-baud modem. It also comes with the Unix operating

system, so it is inherently multiuser and multitasking. With additional terminals it can support up to nine simultaneous users.

The system unit is rather large, with the base measuring 18 inches square. Although this is a bit smaller than the IBM PC, the Unix PC's wedge-shaped design gives the illusion of being larger. The 12-inch green-phosphor monitor with its tilt-and-swivel base is attached to the top of the system unit. The display is bit-mapped with 720 by 328 pixels.

At the back of the machine are three expansion slots, each hidden by its own cover. The modem card occupies one slot, and the machine I reviewed also had a 512K-byte RAM



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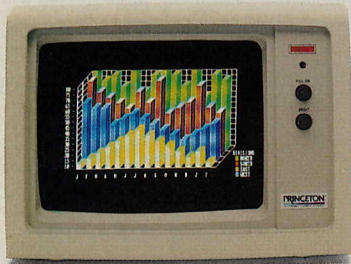
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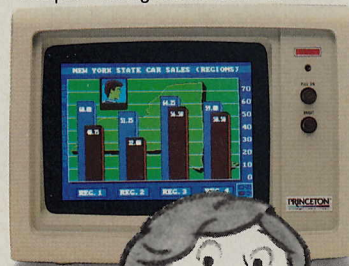
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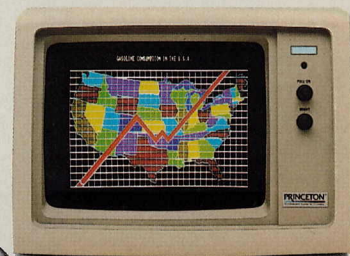
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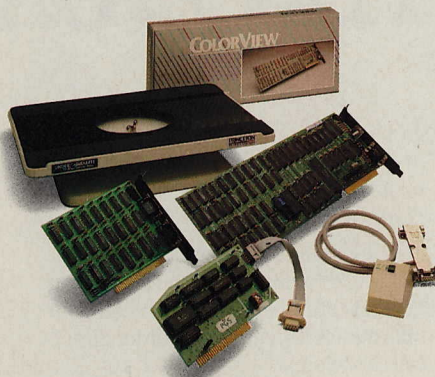
HX-9/9E. Nine inch, high resolution RGB monitor non-interlaced -.28mm dot pitch tube -9E compatible with IBM Enhanced Graphics Adapter -Nonglare screen -Green/amber switch -Apple/IBM colors - Etched dark glass screen -**\$650/\$750 (9E)**



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card, bringing the system total to 1 megabyte. The system can be ultimately expanded to 2 megabytes of RAM. Also on the rear are ports for Centronics-compatible parallel printer and RS-232 interfaces, jacks for two telephone lines, and the reset button.

Keyboard and Disk Drives

The Unix PC's 103-key keyboard is not nearly as good as the IBM PC's—despite that keyboard's awkward key locations. The unit is about the same size as the IBM PC keyboard (18 by 7½ inches), but the typewriter key cluster on the Unix PC is smaller. On the IBM PC, the distance between the Q key and the P key is 7¼ inches; on the Unix PC it is only 6¾ inches. That half-inch difference is just enough to crowd the keys, making them difficult to use.

The two banks of function keys, one on each side of the alphabetical area, are even more cramped—so much so that hitting the wrong key is quite easy. Most of those keys are dedicated to specific functions; 14 are specifically for word processing, and only 8 can be defined by software.

The Unix PC's keyboard also has another peculiarity: the Caps Lock key is just above the left shift key—the normal location for the Control key. Instead, the Unix PC has two Control keys, one to either side of the space bar. Placing the Control keys here has an advantage—there's less chance of reaching for the left shift key and hitting Control by mistake. However, the key arrangement is nonstandard and likely to confuse anyone accustomed to another computer. (Despite these problems, AT&T says the Unix PC's keyboard design will be used in the company's other data-processing products. I predict that there is going to be a healthy after-market for replacement keyboards from third-party suppliers for AT&T products.)

To be fair, the keyboard does have a nice feature: the cursor control keys are in an easy-to-use inverted T arrangement and conveniently located at the bottom of the right bank of function keys. The cursor control keys double as function keys

in much the same way the cursor control keys on the IBM PC keyboard double as numeric keys.

But many users will want to control most cursor movement with the system's mouse. Mechanically, the Unix PC's mouse is like the one used by the Macintosh—a ball protrudes from the bottom and rolls on a desktop. However, I found the Unix PC's mouse system less than precise in its cursor movements. Instead of one button, though, the Unix PC's mouse has three.

When the keyboard is removed from its shelf in front of the monitor, the single 5¼-inch floppy-disk drive becomes accessible. The double-sided, double-density drive stores 320K bytes per disk. Included with the system is a program that reads data disks created on the IBM PC or other MS-DOS systems—a big plus for an office already equipped with this type of personal computer.

The 10-megabyte internal hard-disk drive is accessed frequently by the system. Even when the Unix PC is unattended, the disk will occasionally come to life. In operation the hard-disk drive sounds like a coffee percolator. However, that noise is all but drowned by the noise of the cooling fan, which is somewhat louder than the fan on an IBM PC.

The User Interface

One of the best features of the Unix PC is its user interface. AT&T has taken the windows-mouse-and-menus concept (invented at Xerox's Palo Alto Research Center and popularized by Apple's Macintosh and Digital Research's GEM) and reworked it for business users. The result is easy to learn, easy to use, and sufficiently intuitive to make anyone at home with the machine within a couple of hours. As on the Macintosh, the Unix PC extends the interface to the applications programs, insulating you from the complexity of Unix and providing a consistent, easy way of manipulating the machine. But unlike the Mac's, the Unix PC's user interface can be bypassed by an expert user to gain speed and flexibility.

Most users will welcome the Unix PC's friendly operating environment: if there was ever an operating

system that needed a sugar coating, Unix is it. Experienced programmers will tell you that Unix is a powerful and flexible operating system, but to novices it can be intimidating, nonintuitive, and downright user-hostile.

In the Unix PC, however, you never have to deal directly with the command level of Unix. When you log on to the system, you are confronted with an "office" window containing a list of available services. From there, you can run an application program by selecting items from a menu with the mouse pointer and clicking a button on the mouse.

Each application or function is displayed in its own window. The windows overlap, and you can easily adjust the window size. Because Unix is a multitasking operating system, several windows can be active at once. In the upper left corner of each window is a question mark; point to it using the mouse, click, and you get a context-sensitive help window. The help screens generally do a very good job of explaining what is happening, so much so that you will seldom have to refer to the manuals.

Like the Macintosh, the Unix PC uses a buffer called a wastebasket for deleting material. Deleted work goes into the wastebasket and stays there until you delete the wastebasket contents. This procedure provides backup protection for files erased accidentally.

Unlike the Macintosh, the Unix PC's user interface is less gimmicky. Instead of file folder and wastebasket icons, the Unix PC uses the words "file folder" and "wastebasket." However, one nice Mac feature is missing on the Unix PC—the bar pointer that indicates where a window is in a file.

Once you've learned the user interface, it's easy to use any of the applications. For example, the leftmost mouse button almost always executes the selected command, whether it is closing a window or calculating a spreadsheet. The center button calls up a menu of available commands. The right button is reserved for special functions and can be used by applications software.

Unfortunately, some functions are

missing from the mouse-and-menu user interface. You sometimes are forced to abandon the mouse and use the command keys on the keyboard. This is inconvenient and somewhat confusing.

I found other problems in the user interface. First, a highlighted bar indicates which item is active in a menu. In theory, the mouse pointer and the bar should coincide. That is, as soon as you put the pointer on an item, that item is highlighted and will be selected when you click the mouse. But when you call up a menu window in an area where the pointer already is resting, the machine doesn't sense the pointer until it is moved. If you click the mouse before you move the pointer, you will select the default highlighted item, which may not be the one the pointer indicates. I dumped a file into the wastebasket before I realized this.

Another problem is the "shutdown" command that is listed at the bottom of nearly every menu—right next to the "run" command. The shutdown command closes all files and does the necessary housekeeping to ready the system for power-down. It's the last thing you do before turning off the system, and it's only a finger's twitch away from "run."

AT&T Unix

It's worth noting that the Unix PC's supplied operating system is not the full System V Unix that AT&T has been promoting so heavily. AT&T split the Unix utilities into three packages, and only one of them comes with the machine. The development package, which includes the utilities needed for writing programs, is sold separately for \$395. The various text formatting and editing utilities are part of another package, which is also sold separately for \$495.

AT&T recommends getting the system equipped with a 20-megabyte hard-disk drive (\$600 more) if you intend to develop software on the Unix PC. Unix is a big system and just the operating system kernel and basic utility package require about half of a 10-megabyte hard-disk drive. In fact, the full Unix system and the bundled applications

software will not fit on a 10-megabyte system. Clearly, the standard 10-megabyte drive will fill up rapidly in regular use. A 20-megabyte drive is a good idea for anyone using this computer.

AT&T's adaptation of Unix for the microcomputer world includes some very nice features. For example, it employs a record-locking technique that lets several users access the same database simultaneously without corrupting it.

Another feature, called "file hardening," overcomes an inherent fragility in Unix files: on less protected Unix systems, chunks of data can be lost with depressing regularity.

But in the time I spent with the Unix PC, I had only one file problem, which was easily remedied when I followed the machine's instructions and rebooted. And if a simple reboot does not solve the problem, you can reload your system and data files from your backup floppy disks.

Reloading everything is time-consuming but not difficult. The manual's instructions are explicit, and the procedure is so easy that anyone can do it. Backing up is just as easy. The backup function is relatively swift and is called from the menu; the system tells you how long it will take and how many formatted disks you will need. This is a good example of the care that went into the Unix PC's user interface.

Virtual Memory

The Unix PC is the first desktop personal computer from a major manufacturer to use "virtual memory," which should eliminate any worry about running out of RAM. The idea behind virtual memory is fairly simple. The available RAM is divided up into small pages, and information is stored on disk in page-sized chunks. When a program is executed, the starting page is loaded into memory from the disk, and it begins executing. When that page is done, the operating system calls in the next page.

Eventually the RAM fills up with pages and the operating system starts swapping the already-used pages back to the disk to make room

for new pages—in effect, fitting a quart of program in a pint of RAM. With virtual memory, the entire process is handled by the operating system, so neither the operator nor the application program and its programmer has to worry about it.

For all its benefits, this process takes time and can seriously degrade the performance of the computer. The virtual memory system is, in fact, one of the reasons the Unix PC accesses the hard-disk drive so often—which contributes to the machine's lackluster speed.

Speed Tests

AT&T's terminals for the Unix PC were not yet available, so I tested the Unix PC only as a single-user system. The tests I ran resulted in a paradox. As you might expect from a computer built around a 68010 microprocessor, the underlying hardware is fairly fast. However, the net, overall speed on practical jobs was disappointing.

For example, one benchmark program that tests the system's raw processing power showed the Unix PC to be over 200 percent faster than an IBM PC—comparable to the reported times for other 68000-based systems. But a spreadsheet benchmark test—more indicative of real-life operations—found the Unix PC to be only 30 to 40 percent faster than the IBM PC, far less than what you'd expect based on the hardware and its 10-MHz clock speed.

However, AT&T claims that the Unix PC's performance ranks high against other Unix workstations (most of which are controlled by minicomputers), and I'll not disagree—Unix systems are not noted for their speed. What's more, other factors, such as the difficulty of testing software under different operating systems, complicate the speed issue.

Originally, I tried to run identical 4000-cell Microsoft Multiplan spreadsheets on the Unix PC and the IBM PC, using appropriate versions of the software. But as it turns out, Microsoft ported Multiplan to the Unix PC without optimizing it for the new hardware, resulting in inefficient code. (This inefficiency was made clear when a 512K-byte IBM PC handled the full 20-column

READ ONLY

A review of the IBM Personal Computer Family. Vol. 2 No. 2

If your job is program development, the IBM EZ-VU Development Facility can help you write menu-driven applications—or revise existing ones—that are both sophisticated and easy to use. It incorporates a screen design tool that works through the function keys on your IBM Personal Computer, so there are no special codes and commands to slow down your design work. EZ-VU also helps

make fast work of testing and revising your screen designs.

Two additional points. Both of these EZ-VU programs benefit from years of success by similar dialogue management programs in IBM host MVS, VM, and VSE operating environments. And both run under the IBM TopView program, which allows you to run a number of software applications concurrently.

A quantum leap. Speaking of technological advances, IBM Personal Computer Professional FORTRAN represents a quantum leap forward in FORTRAN for microcomputers.

It's a full ANSI 77 implementation with enhancements that offers an un-

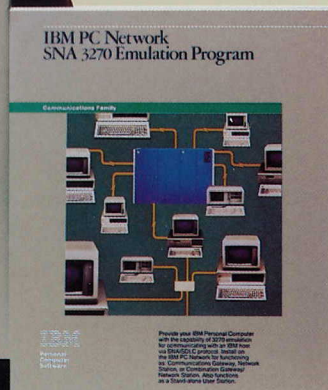
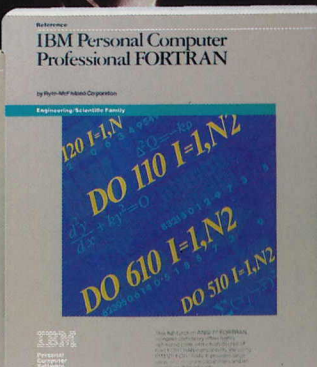
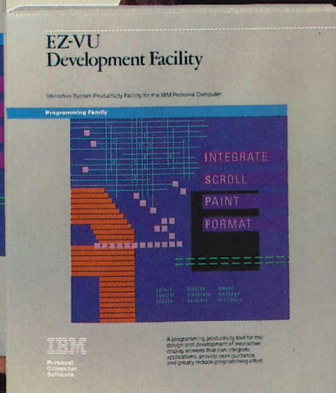
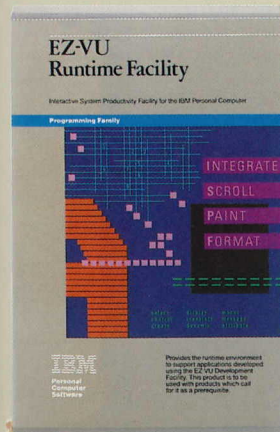
Application management, program development, and communications software from IBM. See next page for IBM PC Network SNA 3270 Emulation Program story.

WHAT'S THE PROGRAM?

Meaningful dialogue. There are two programs from IBM that can greatly improve the quality of our running dialogue with computers. They are the IBM EZ-VU Runtime Facility and the IBM EZ-VU Development Facility.

Think of the EZ-VU Runtime Facility as a mediator in your IBM PC conversations. It handles the exchange of commands and information between you and your application programs through predefined screens. It can give you a single consistent interface with applications written in a variety of languages.

In short, the EZ-VU Runtime Facility lets you concentrate on the essentials of the job you're doing.



usual combination of speed and accuracy. Optimization techniques and features such as a full symbolic interactive debug facility are similar to those usually found only in IBM VS FORTRAN and other mainframe FORTRAN compilers.

You can use IBM PC Professional FORTRAN to work on large or small host programs and to recompile existing FORTRAN programs—or sections of those programs—to run on your IBM Personal Computer. It's ability to handle arrays larger than 64KB gives you the equivalent of mainframe capability on a personal computer.

And IBM PC Professional FORTRAN was designed for IBM by Ryan-McFarland Corporation to help you take full advantage of other IBM Personal Computer software, such as the IBM Personal Computer Engineering/Scientific Series graphics development tools.

Make that "quantum leaps."



HARDCOPY

Hidden talent. Think of the many entertaining and useful programming ideas that must exist out there but never find their way to market.

The IBM *Directory* of personally developed software gives you direct access to some of that hidden talent. It's a catalog of unique programs developed by individuals for the IBM Personal Computer Family.

Programs listed in the *Directory* sell for as little as \$14.95. They cover a wide range of interests, from entertainment and education to personal productivity and business applications.

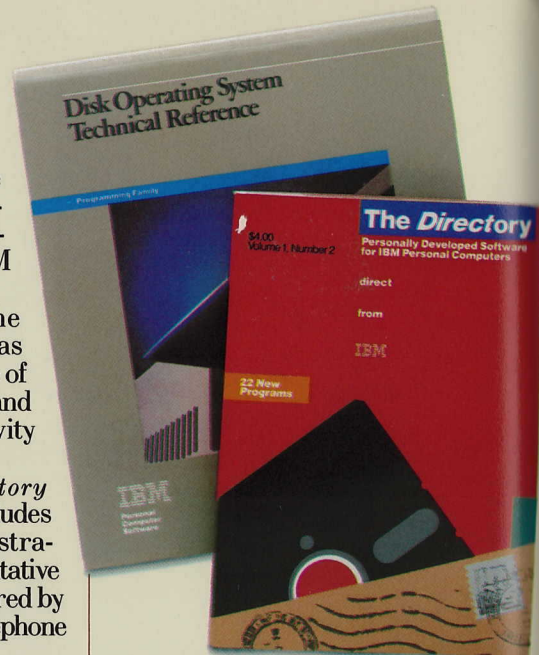
Each program in the *Directory* has a full description that includes system requirements and illustrations or color photos of representative screens. Programs may be ordered by mail or through a toll-free telephone number.

To subscribe to the *Directory*, call 800-IBM-PCSW.

The last word. Or perhaps we should say the last word to date. The new IBM DOS Technical Reference manual contains just about everything you'd want to know about the IBM Disk Operating System Version 3.1 and previous versions 2.1 and 3.0.

That's not to say that new improvements and information won't appear in the future. They will, and you'll be kept abreast of such developments. An update information service is included in the manual's purchase price.

So you'll always have the last word.



Updated versions of the DOS Technical Reference manual and the *Directory of Personally Developed Software* from IBM.



FAMILY TIES

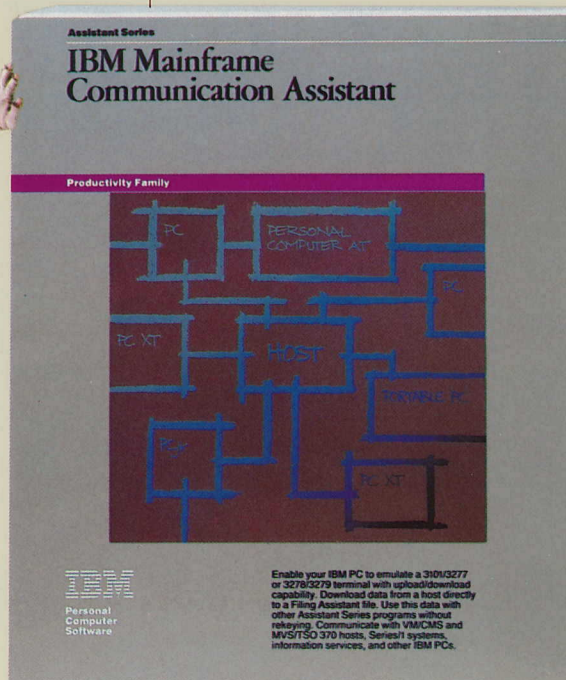
Close connections. The IBM PC Family has always included hardware and software to help you keep in close touch with important contacts.

Last year's announcement of the IBM PC Network, for instance, was an important milestone in communications among the immediate family. It gives you an easy way to share information and hardware resources like printers and disk storage devices.

There are two recent IBM communications software products that extend those IBM PC Family connections even further. They make it possible for you to work directly with data stored on an IBM host computer, to communicate from one network to another, and to do an even wider range of your daily business over the IBM PC Network.

Host communications. The IBM PC Network SNA 3270 Emulation Program, for example, allows your IBM Personal Computer to communicate with an IBM host system through telecommunications lines.

Broaden your IBM PC connections with communications software from IBM.



You then have direct access to the data and programs on the host computer. So if you're working on a branch-office quarterly report, you no longer have to wait while essential data from a headquarter's computer is sent to you and copied for your use. There's also a redirector function that allows you to place the data on a file server for distribution to other stations on your IBM PC Network.

In addition, when the program is installed on an IBM Personal Computer in an IBM PC Network, that PC can act as a communications gateway for other members of the same network. If members of a network need to communicate with more than one IBM host computer—or with different applications on the same host—multiple gateways can be attached to a single IBM PC Network.

And an IBM PC with the IBM PC Network SNA 3270 Emulation Program installed can still be used as a network station doing standard PC work.

You could, for instance, use your IBM PC to create a data set on a host system. You could also create a word processing project on your IBM PC using DisplayWrite 3*, switching easily back and forth between them without terminating either session. The IBM PC Network SNA 3270 Emulation Program also allows you to transfer graphics printing jobs from the host to an IBM PC with a graphics printer attached.

Stand-alone assistance. There's a new addition to the IBM Assistant Series to help handle stand-alone communications between your IBM Personal Computer and a host machine or another IBM Personal Computer. IBM Mainframe Communication Assistant software includes a 3101 and 3270/78/79 terminal emulator for your IBM PC, plus a set of host computer support programs for VM/CMS and MVS/TSO systems.

Mainframe Communication Assistant has the same easy menu structure as other members of the Assistant Series, such as Writing Assistant and Planning Assistant. And it offers a number of unusual features to simplify your communications work.

It can, of course, speedily transfer files between host and PC (or PC

Quiet, please. The printer technology is as advanced as the computer. It's versatile, compact, remarkably quiet, work that might make people think you've got a printing press in the back room.

In this case, the spark behind the revolution is a new method of resistive ribbon, non-impact printing developed by IBM. The "Quietwriter" Printer replaces print elements or hammers that strike the page with a unique multi-layer ribbon and print mechanism that virtually "paints" characters on the paper.



IBM Quietwriter® Printer offers advanced printer technology and unusually low operating noise level. Shown with sample of letter-quality printing.

and PC). After you've worked with the host file, Mainframe Communication Assistant lets you transfer only the changes you've made—rather than the entire file—back to the host computer.

And, as a member of the Assistant Series, Mainframe Communication Assistant allows you to integrate mainframe database information into Filing Assistant files. You're then able to transfer that information to other members of the Assistant Series, saving the time and effort of reentering data that has been stored on a mainframe computer.

*Follow the proper installation instructions in the IBM PC Network 3270 Emulation Program documentation for DisplayWrite 3.



HARDWARE NEWS

Quiet, please. There's been a quiet revolution in printer technology. The IBM Quietwriter® Printer is as ad-

vanced as the computers it serves. It's versatile, compact, remarkably quiet, and produces work that might make people think you've got a printing press in the back room.

In this case, the spark behind the revolution is a new method of resistive ribbon, non-impact printing developed by IBM. The "Quietwriter" Printer replaces print elements or hammers that strike the page with a unique multi-layer ribbon and print mechanism that virtually "paints" characters on the paper.

As a result, the "Quietwriter" Printer produces superb, letter-quality printing on a variety of papers and in a wide range of type styles. To change type styles you just unplug one font module and plug in another. And because the "Quietwriter" Printer can accommodate two font modules, you can have two type styles online at once.

The "Quietwriter" Printer also allows you to produce a wide array of character graphics either separately or to highlight reports and correspondence.

And it does all of this very, very quietly. At 50 dB, the IBM "Quietwriter" Printer* makes less noise while printing than many printers make while idling. That means you can put the "Quietwriter" Printer wherever it's most convenient; it won't disturb either your telephone conversations or your train of thought.

Unconventional ability. IBM also makes conventional printer technology seem anything but conventional.

Consider the IBM Wheelprinter,* for example. Its printwheel is designed to provide sharp, clear letter-quality printing even after millions of impressions. And the printwheel is easy to change, which is important because there's a selection of over 500 printwheels to choose from. The Wheelprinter's standard features also include both automatic sheet feed and continuous forms feed—optional on many other printers.

The Wheelprinter is reliable enough to take on high-volume office work. It even works with two types of ribbons to suit the requirements of different types of jobs. There's a single-strike ribbon for finished reports or correspondence. For more routine jobs like purchase orders or internal memos, you can use a longer lasting, lower cost multi-strike ribbon.

The Wheelprinter has equally impressive qualifications as a home printer. To begin with, it's remarkably easy to use. The Wheelprinter's integrated paper path provides reliable cut-sheet printing and allows it to do much faster work than you might expect from a 25cps printer. And its acoustically engineered cover makes the Wheelprinter an exceptionally quiet impact printer.

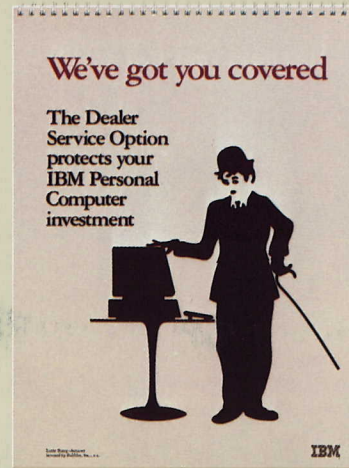
Maybe "conventional" isn't the right word at all.

*These are just two of the various printers available from IBM for the IBM Personal Computer Family.

ON THE STOREFRONT

Extra attention. Even the best equipment sometimes needs a little extra attention. An IBM Dealer Service Option can provide it. It gives you extended service coverage for IBM Personal Computer products, and is

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An IBM Dealer Service Option also covers a couple of important additional contingencies. If you move, your service coverage can be honored by a participating Authorized IBM Personal Computer Dealer in your new location. And if you should decide to sell your IBM Personal Computer product, your Dealer Service Option may be transferred to the new owner.

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TIPS AND TECHNIQUES

Stop action. If you occasionally sit frozen while screen after screen of information rolls by too fast to read, take heart. There's more than one way to stop that cascade of data and view one screenful at a time.

When listing the directory of a diskette or fixed disk, the command DIR/P will do the trick. After finishing with one screen, press any key to bring up the next.

To slow down the listing of a text file, you could use the CTL/NUM LOCK keys, but that involves keeping both hands on the keyboard and an eye on the screen.

Instead, check your DOS directory listing to make sure the DOS utility program MORE.COM is available. Then, at the DOS prompt A>, type the command line MORE<filename and press enter.

NOTE: be careful to use "<" and not ">"; if you enter the wrong one, you'll destroy your text file.

To view a file called PC-WRITE.DOC, for example, enter MORE<PC WRITE.DOC. That will list a single page of text on your screen and display the message —MORE—. Again, press any key to view next screen.

Voilà, perfect control.

Thanks for this tip to Chuck Harrington of the Athens, Ohio, area IBM PC Users Club.

Thanks also—and apologies for omitting a note of credit in the last issue of *Read Only*—to Ed Smuckler of the Redondo Beach, California, Greater South Bay User Group for his tip about setting screen colors.

For more information about IBM Personal Computer products discussed in this issue of *Read Only*, see your Authorized IBM Personal Computer Dealer or IBM Product Center. To learn where, call 800-447-4700. In Alaska and Hawaii 800-447-0890.

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POPULAR REVIEWS HARDWARE

by 200-row test spreadsheet easily, but the Unix PC with a megabyte of RAM ran out of memory in row 156. I had to settle on a 150 by 20 version of the spreadsheet for the test on both machines.) Microsoft has promised an optimized version of Multiplan, and it is reasonable to expect that version will do better.

Therefore, the spreadsheet test I

line services. It even has a timer to help you control your long-distance bill.

The program also has a phone log that automatically tracks incoming and outgoing calls, including the time of call and number dialed. It also stores short notes you make about the call. And as if that were not enough, you can specify the type

"break" signal is missing, which can be a distinct handicap.

Application Software

AT&T also bundles three application packages—the Supercomp 20 spreadsheet, a business graphics package, and a word processor. While the programs fulfill basic business needs, none is spectacular.

Supercomp 20 is no threat to Lotus 1-2-3 or, for that matter, any other major spreadsheet. It works, but it doesn't make good use of available memory and is deadly slow on some operations. Like Multiplan, Supercomp could not handle the 4000-cell test spreadsheet.

It could, though, handle a 3000-cell spreadsheet but not always gracefully. Any editing on a Supercomp spreadsheet, other than changing a cell value, slowed Supercomp to a crawl. The 3000-cell test spreadsheet took nearly 11 minutes to calculate the first time. Lotus 1-2-3 on an IBM PC does the same operation in a matter of seconds. However, a subsequent recalculation on Supercomp after altering the cell containing the constant produced a much more respectable time of 9.8 seconds.

The word processor is a full-featured program modeled after dedicated word processors like the Wangwriter, and it takes advantage of the system's dedicated word-processing keys. But the word processor, too, tends to be slow. Although I wasn't able to overrun the type-ahead buffer, the program hesitated before displaying each character. I suspect that if I was more at home with the keyboard I could type faster than it could display.

Another drawback to the word processor is the amount of text displayed. Even with the largest window I could make, I couldn't get more than 17 lines of 64 characters each. That's not totally unusable, but it's not nearly as good as having the typical 24 lines of 80 characters that other personal computer word processors offer. Even worse, this limit on window size is a characteristic of all programs on the system.

The business graphics package is plain vanilla. It produces line charts and pie and bar graphs and can han-

AT A GLANCE

The AT&T Unix PC

	POOR	GOOD	EXCELLENT
Graphics			
Word Processing			
Spreadsheet Analysis			
Database Management			
Telecommunications			
Program Development			

Reviewer's Note:

The AT&T Unix PC is a personal business computer that is very easy to learn and use. Moreover, it is a serious challenger to IBM in the office market.

Manufacturer:

AT&T Information Systems, 1 Speedwell Ave., Morristown, NJ 07960; (201) 898-8326 or (800) 247-1212

Standard Features:

68010 processor; 512K bytes of RAM (expandable to 2 megabytes); 10-megabyte hard-disk drive with virtual memory support; 320K-byte floppy-disk drive; 1200-baud modem; green-phosphor monitor; bit-mapped 720- by 348-pixel display; 103-key keyboard; mouse; Centronics-compatible parallel printer port; RS-232 interface; two telephone interfaces; clock/calendar; Unix System V operating system with user interface and context-sensitive help screens; communications manager; spreadsheet; word processor; business graphics package

Base List Price:

\$5590

Options:

512K-byte RAM card (price not available at this time); Unix programming utilities (\$395); Unix editing utilities (\$495)

ran is not an absolute measure of system performance. It does, however, point to the Unix PC's general inability to make the most of its fast hardware.

The Communications Manager

As you might expect from AT&T, the best software on the system is the communications manager, which controls a desk phone and the built-in modem. It has almost every feature that's on my wish list. First, it has a full-feature auto-dial phone directory. In addition it maintains a shorter quick-dial directory of numbers you can call with a single keystroke. It also stores the settings and codes required by modems or other communication devices and on-

of call you want to track (incoming, outgoing, how long the call has to be connected before being logged, and so forth).

The communications manager is active whenever the computer is on. You can place a call while running an application program just by bringing up the proper window and hitting a button. If you have two telephone lines, the program assumes the second one is a data line unless you instruct it otherwise. If you have only one line, you can switch between voice and data as needed.

The only major failing in the communications manager is its terminal emulator. It emulates a Model VT-100 terminal, but the emulation is not complete; the ability to send a true



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dle scaling. One particularly nice feature of business graphics on the Unix PC is that the user interface makes it easy to import data from another application program for graphing.

Besides the bundled software and Multiplan, several other application programs are available for the Unix PC. And a number of major software companies, Ashton-Tate, for example, have announced support for the machine, so other popular software packages should be available shortly. Of course, how useful those programs will be depends on how the software developers tailor them to the Unix PC.

As a Unix machine, the Unix PC can, theoretically, run most made-for-Unix software. But the whole issue of Unix business software is complicated. Compared to what is available for MS-DOS, CPM, or even Tandy's TRSDOS and Apple's ProDOS, there's not much. And a lot of what's available is not well suited to small businesses that do not have a resident Unix expert.

Nonetheless, it's a safe bet that nearly all Unix-based application software will soon be offered for the Unix PC. It's also a safe bet that many program developers will be quick to jump on AT&T's Unix bandwagon. Unix is, after all, one of the best environments for software development.

The New Standard?

What it all adds up to is this: the AT&T Unix PC is a solid competitor without being a world beater. Unix notwithstanding, it probably won't sweep the field of personal computers. But given its capacity and easy-to-learn user interface, the Unix PC should give the IBM PC AT and its many clones a run for the office. And it may spell big trouble for Apple's attempt to push the Macintosh into the business market.

The Unix PC is best suited to businesses that want to install computers with a minimum amount of fuss. You could get the same functionality from an IBM PC or PC AT—if you selected additional hardware and a user interface, installed the software, and generally integrated the whole package. But the

result would probably cost more than the Unix PC.

In less than an hour you can unpack the Unix PC and load the software from the floppy disks. The integration chores are already done for you. Teaching employees to use the machine will take only a couple of hours of classes. All neat, simple, and fairly painless.

Though other machines also address those points, none of them offers the Unix PC's combination of features. Assuming that good application software becomes available quickly, AT&T should go places with the Unix PC.

—RICK COOK

Rick Cook lives quietly in Phoenix, Arizona, surrounded by cats, computers, and books, not always in that order.



The Tandy 1200 HD

An IBM PC XT-compatible workhorse at a bargain-basement price

Radio Shack calls its Tandy 1200 HD computer a mirror image of the IBM PC XT, and in operational compatibility—a most important way—that is true. Like the XT, the Tandy machine is built around the Intel 8088 microprocessor operating at about 4.7 MHz. It has one 5¼-inch floppy-disk drive,

a 10-megabyte hard-disk drive, and five full-length expansion slots that accept expansion cards designed for the IBM PC. But what makes the Tandy 1200 HD really special is that, right out of the box, it runs every important piece of software written for the IBM machine.

In fact, over several weeks of testing, the 1200 HD flawlessly booted and ran programs as diverse as Lotus's 1-2-3, ThinkTank, dBASE II, WordStar, and Flight Simulator.

However, the 1200 HD differs from the XT in one rather significant way. It has a list price of only \$1999, as compared to the current list price of \$3495 for the XT. Even the frenzied cost-cutting among IBM dealers hasn't brought the price of an XT anywhere close.

The Compatibility Issue

Computer industry pundits are fond of calling IBM workalikes "clones," as if the machines were exact duplicates of those made by Big Blue. If they were, of course, IBM would have had their manufacturers in court long ago.

In fact, IBM's machines have copyrighted ROM chips with a BIOS (basic input/output system) that interfaces the hardware with software. Also in the ROM is a version of BASIC licensed only to IBM, and no other company may duplicate the BIOS or BASIC in IBM's ROM chips. So the issue is one of mimicry rather than duplication.

The Tandy 1200 HD's ROM is a fine mimic of IBM's ROM—and well it should be. The 1200 HD, unlike other Tandy computers, is built by Tandon, a manufacturer of disk drives that has also supplied drives to IBM. Tandon engineers, being intimately familiar with IBM's ROM, were able to design a system that acts very much like the XT. Industry rumor has it that IBM is more than a little irritated by the Tandon knockoff; relations between the two companies are said to be strained.

The ROM is not the only way in which the 1200 HD differs from the XT. The machine has a slightly more compact main circuit board, although, like the XT, it has a socket for an 8087 math coprocessor. The power supply, important because extra wattage is needed on both machines to power the hard-disk drive and add-on cards, is slightly smaller than that on the XT—128 watts as compared to the XT's 135 watts. The difference shouldn't really matter, though; add-on cards generally use less than 10 watts apiece.

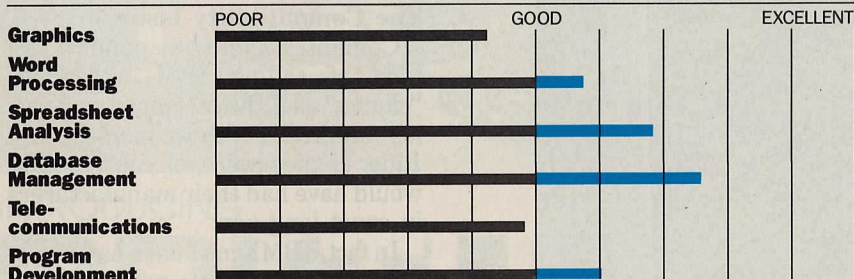
The Tandy machine comes equipped with 256K bytes of RAM, expandable to 640K bytes with an expansion card. The five expansion slots—three fewer than in the XT, which has six long slots and two so-called short slots—are alongside two banks of switches used to configure the system.

In both the 1200 HD and the XT,

bytes by adding Tandy's Captain Multifunction Board (\$795), which gives you 384K bytes of additional RAM, an RS-232 port, a clock, and 24 ROM-based programs that do everything from checkbook balancing to simple filing. But before investing in Tandy boards, check around. Competition is keen, and you might get a better price on a

AT A GLANCE

The Tandy 1200 HD



Reviewer's Note:

The Tandy 1200 HD is an outstanding low-priced alternative to IBM's PC XT. It is solidly built, highly compatible, and has some features not standard on the XT. Moreover, it comes from a company that historically supports what it sells.

Manufacturer:

Tandy Corp., 1700 One Tandy Center, Fort Worth, TX 76102; (817) 390-3700

Standard Features:

4.7-MHz 8088 microprocessor; 256K bytes of RAM, 8K bytes of ROM; 5¼-inch, 360K-byte floppy-disk drive; 10-megabyte hard-disk drive; Centronics-compatible parallel printer port; five full-size expansion slots (one slot each used by floppy-disk controller, hard-disk controller, and display adapter)

Base List Price:

\$1999

Options:

Monochrome display adapter (\$219); VM-3 monochrome monitor (\$219); color graphics display adapter (\$299); CM-2 color monitor (\$550); MS-DOS and GWBASIC package (\$90); Captain Multifunction Board (\$795)

the term expansion slot is somewhat misleading because some of the slots must be used by cards that perform essential functions. In the 1200 HD, one slot is used by a floppy-disk controller, one is used by the hard-disk controller, and a third is filled by a display adapter (either color, with graphics, or monochrome). The Tandy disk-drive controller card has a parallel port built in, so it evens the odds a little with the XT, which must use one of its slots for a parallel port.

Although the 1200 HD's slots accept cards made for the IBM machine, Tandy also offers its own cards. A Tandy monochrome display adapter costs \$219 and a color graphics display adapter is \$299. You can boost the RAM to a full 640K

multifunction board.

The same is true of other components. The 1200 HD I tested came with Tandy's CM-2 color monitor (\$549.95), which had 16 clear colors and a sharp character display. Tandy also offers a VM-3 monochrome monitor for \$219. I have seen other monitors of equal quality, though, and if you shop around, you may beat Tandy's monitor prices, too.

Using the 1200 HD

Setup of the 1200 HD is straightforward—just plug in the keyboard, the monitor, and the power cord. But getting the machine up and running takes awhile. Tandy recommends that you format the hard disk—and we're not talking about the hard-disk format procedure that most com-

puter users are familiar with. The 1200 HD requires the kind of low-level formatting the manufacturer does at the factory. The point is to test the hard disk and to correct, if possible, minor damage that might have occurred to the disk's surface in transit (hard disks are vulnerable to that kind of damage).

The procedure isn't difficult, although the manual is a little confusing. You type in a few commands, and the computer goes to work—for up to an hour, the manual tells you. The machine I had took closer to 40 minutes to do this formatting.

After the low-level formatting, you can partition the hard disk, if you need to, with a supplied program. Then, finally, you perform the formatting routine that you would go through with any new hard disk. The computer takes about 15 minutes to complete this, and at last you are ready to go.

The 1200 HD uses MS-DOS version 2.11, which Radio Shack sells for \$90. With it you get GWBASIC, the version of BASIC that best mimics IBM's BASIC in ROM. The manuals for both—they're packaged in a single case—are straightforward and well designed. But there is no index, an annoyance when you need just a tidbit of information.

The 1200 HD's 84-key keyboard differs slightly from the standard XT keyboard and significantly from IBM's Selectric typewriter keyboard. People accustomed to typewriters may have a difficult period of adjustment. Those familiar with the IBM PC or PC XT keyboard will note that the much-maligned backslash key, which on the IBM keyboard is inside the lefthand shift key, has been moved outside the shift key on the 1200 HD. The Tab, Backspace and Return keys have been given names replacing the cryptic arrows on the IBM keyboard.

Mercifully the 1200 HD keyboard doesn't produce the audible click of the IBM keyboard. I appreciate the peace and quiet of the 1200 HD. I am a keyboard buff and overall I found it very pleasant to use.

When I tested the 1200 HD against the XT for processing and disk access speeds, the Tandy machine proved to be slightly faster at

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processing (4.7 percent faster to be precise), a few seconds faster at writing to its hard disk, and a few seconds slower at reading from its hard disk. The differences were slight—so slight that it is fair to say you would never notice them under normal operation.

The \$1999 Question

Is the Tandy 1200 HD a worthwhile machine? Allow me to get a little philosophical for a moment. I can well understand selling a workalike machine solely to skim a little of the cream from IBM's giant milkvat.

Tandy, once upon a time, gave us a wonderful machine—the Tandy 2000, which was faster, sleeker and in every way better than the IBM PC. But the 2000 wasn't an IBM workalike and sales were dismal. Swallowing its pride along with a bitter lesson, Tandy set out to build the Tandy 1000—more compatible and less expensive. It was the beginning of what might become a tradition at Tandy—trying to skim some cream.

At the same time, Tandy went to an outside source for the 1200 HD—the most compatible of the Tandy compatibles. The result is a workhorse: sturdy, well designed, and for those of us who care about such things, about as technologically innovative as wing-tipped shoes.

Ah, well. Back to the \$1999 question. Before you decide to purchase a 1200 HD, or for that matter, an XT, consider this. With the demise of the PCjr, and the likelihood at this writing that IBM will come out with a second-generation personal computer, the future of the XT—and therefore the XT workalikes—is uncertain.

IBM is clearly committed to its top-of-the-line personal computer, the AT, and somewhere down the road the old 8088 microprocessor may be yesterday's news. If, in fact, that is the case, then the XT itself is likely to come down in price, and the present cost advantage of the 1200 HD could vanish like ground fog on a hot summer morning.

But the Tandy 1200 HD is truly a mirror image at a bargain-basement price. And Tandy is a reputable alternative to IBM, with some 1200

Radio Shack computer centers, many with on-site repair facilities. I offer the standard warning: it's impossible to test every piece of software on any machine, so if there are programs you know and love, try them in the store before you buy the 1200 HD. That said, I'd recommend the

1200 HD to anyone—especially anyone who already uses IBM personal computers and wants to add additional desktops without the expense of the IBM monicker.

—JONATHAN SACKS

Jonathan Sacks is a West Coast editor of *Popular Computing*.



The Osborne Vixen

*Osborne comes back
with a remake of an old standard*

The introduction of a new CPM computer in today's MS-DOS-dominated market might be expected to evoke little more than muffled yawns. That was not the case this spring, though, when Osborne Computer Corp. brought out the Vixen, the company's first offering to American purchasers since it reorganized following highly publicized bankruptcy proceedings during the fall of 1983.

Between 1980 and the summer of 1983, Osborne surprised both the business world and the computing public with its innovation and phenomenal growth. Its first product, the Osborne 1, was new to the industry—a transportable computer light enough to carry, small enough

to tuck under an airplane seat, and self-contained, with keyboard, monitor, and disk drives all enclosed in one unit. Its low price included a top-selling word processor, WordStar, and Personal Pearl, a good middle-weight database program. Osborne computers appealed to bargain-conscious first-time purchasers as well as to individuals who already used computers at work but who wanted the added benefit of portability. In just one month at the end of 1982, Osborne realized \$10 million in sales.

However, in September 1983, to the dismay of Osborne's creditors and loyal customers, the company sought bankruptcy. A service contract with Xerox guaranteed con-

tinued support for individuals who had already purchased Osborne computers, but it appeared that promised upgrades and new products would never materialize. Now Osborne, with its Vixen, has once more taken the computer industry by surprise.

The Inviting Vixen

More graceful in appearance than previous Osbornes, the 23½-pound transportable Vixen is housed in a compact white case with charcoal trim and a comfortable handle. One end swings down on hinges to reveal the typewriter-style keyboard, 7-inch amber monitor, and twin 5¼-inch disk drives. When set up, both keyboard and screen rest at angles that should be comfortable for most users. Vixen's monitor is easy to read despite its small size. It offers inverse video but not underlining or highlighting.

A removable back panel hides the controls and various interfaces: the on/off switch, a reset button, monitor brightness control, an external video port, Centronics-compatible parallel and RS-232 serial ports, and the power connector. There's also a switch that lets you select domestic 115-volt or European 230-volt power. The electrical cord can be squeezed in behind this panel, but it's easier to tuck it into a coat pocket along with the software when you travel.

The keyboard has a firm feel, although it produces a rather hollow click. The arrow keys are awkwardly placed, two on either side of the space bar. There aren't separate function keys, but the number keys can be combined with the Control key for use as function keys.

The disk drives can format standard double-sided, double-density 5¼-inch disks to hold 390K bytes of data, some 30K bytes more than is possible with IBM PC-DOS. The operating system controls the disk drives for maximum efficiency—nothing ever has to wait, as often happens in other systems. And when transferring material from one disk to another, Vixen can copy data in large chunks in record time.

The operating system allows Vixen to read disks formatted by pre-

vious Osborne computers as well as those in IBM CP/M-86, DEC VT180, Xerox 820, and Cromemco formats. A 10-megabyte hard-disk drive is available from Osborne for \$1495. Vixen will automatically boot from the optional hard-disk drive with no further modification.

Inside Vixen is a Z80A microprocessor and 64K bytes of RAM. Although you'll need to attach a modem to the serial port for transferring most data, Vixen has a built-in bisynchronous communications capability that lets it act like a terminal for any computer using the HASP communications protocol. With the appropriate cable and software, the Vixen is able to transfer data at very high baud rates.

Free Software

Vixen comes with the CP/M operating system and a good selection of applications software. Included are WordStar 3.3, MailMerge, SuperCalc 2, Microsoft BASIC 5.21, a game, a simple graphics program, and an excellent utility program called Media Master from MDG and Associates.

The Media Master utility is a real bonus. In addition to simplifying file handling for the Vixen, it also lets Vixen format disks for any of 26 different 5¼-inch disk operating systems, then copy data files to them. It displays or prints disk directories and copies or erases files made with any combination of the disk formats it recognizes. Using Media Master, you would have no trouble transferring text files back and forth between a Vixen at home and an IBM PC or compatible at the office (a version of Media Master for the IBM PC is available from MDG and Associates).

The least impressive program in the package is Osboard, a very primitive graphics generator that lets you mark off blocks of the screen and fill them with figures from Vixen's character set. The process is tedious and the results less than impressive. Osboard's sequel, Rembrandt, looks better, though the displays are still blocky. Plan on upgrading if you want good graphics.

The only additional software for Vixen that's available from Osborne

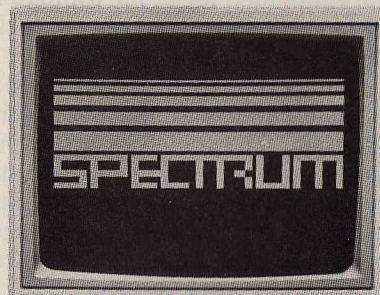
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POPULAR REVIEWS HARDWARE

is a communications program called Haste, which allows the Vixen to communicate with other computers at rates of up to 34,000 baud. However, Vixen comes with a year's membership in FOG, the First Osborne User's Group, which is an excellent source of public-domain software tested on Osborne computers. In addition, some CP/M soft-

chine was not a fluke. According to Jim Schwabe, vice president of product marketing and one of four original Osborne employees who effected the company's revival, Osborne plans to continue active support of the CP/M community. The feeling at Osborne is that people who are comfortable with an operating system and its software

modified with commands from the CP/M menu. The Setup command lets you indicate which port is being used for the printer, whether you want to set the arrow keys for CP/M or WordStar, and what key sequences you want each function key to represent. You can also preset the serial port's baud rate and other parameters. In each case, selections are made from menus, so you don't need to learn complex commands.

AT A GLANCE

The Osborne Vixen

	POOR	GOOD	EXCELLENT
Graphics	■		
Word Processing		■	
Spreadsheet Analysis		■	
Database Management		■	
Telecommunications		■	
Program Development		■	

Reviewer's Note: Vixen has many features directed at making computing as efficient as possible. It's an excellent choice either as a first computer or as a portable backup for a CP/M or MS-DOS computer.

Manufacturer: Osborne Computer Corp., 42680 Christy St., Fremont, CA 94538; (415) 490-6885

Standard Features: Z80A 8-bit microprocessor; 64K bytes of RAM; 60-key keyboard with four cursor keys; number keys programmable as function keys; 7-inch amber 80-column by 25-line screen; two double-sided, double-density 5¼-inch floppy-disk drives; RS-232 serial port, Centronics parallel port, external composite video jack; 50/60 Hz, 115/230-volt selectable power supply; CP/M 2.2; WordStar 3.3; MailMerge; SuperCalc 2; Media Master; Microsoft BASIC 5.21; Osboard (graphics), Desolation (game)

Base List Price: \$1298

Options: 10-megabyte hard-disk drive and controller, \$1495

ware intended for other computers can be transferred to Osborne disks using Media Master.

Four softcover instructional manuals cover operation of the computer and the bundled software. One is devoted entirely to WordStar and SuperCalc 2 and one to programming and graphics. The other two acquaint new users with the computer and the operating system.

Flying the CP/M Standard

The CP/M operating system and eight-bit microprocessors have been around for a long time now, and many thoughtful consumers wonder whether the time has come to retire them. Even Osborne has been selling an IBM PC-compatible lap computer in Europe for months. Nevertheless, making Vixen a CP/M ma-

shouldn't have to change in order to get improved products.

Vixen's version of the CP/M operating system comes with an easy-to-use software "shell" that could lure experienced MS-DOS users into the CP/M fold. Even the startup message is encouraging. It instructs you to put a disk in the drive, rather than printing an error message on the screen. Unless you specifically ask for it, you never need look at an A>. Disk formatting and copying, program loading, even CP/M commands themselves, are all accessible from plain English menus. Short batch files are automatically added to the menu. A simple procedure lets you choose which program will start when the computer is booted with a particular disk.

A number of features can easily be

Using the Vixen

Vixen was already in development when Osborne Computer Corp. collapsed, and it spent some time on the back burner while the company regrouped. Like good chili, Vixen benefited from the long simmering as problems were worked out and interesting ideas were developed. One of those ideas became a 255-character type-ahead buffer (the IBM PC buffer has room for only 20 or so). Fast typists will find the buffer extremely valuable. On the other hand, if you've typed ahead of the program, a mistake could spell disaster, so Vixen has included a three-key escape sequence that will flush the buffer once you realize you've made a mistake.

Function-key settings load automatically from the setup file, but you can change them at any time from the keyboard. The arrow-key functions can also be changed if necessary. Pressing the Ctrl-Shift-Del key sequence, borrowed from the IBM PC, performs a software reset. If you press Tab instead of Return on start-up, the computer reverses the drive designations—A becomes B and vice versa. This should be reassuring to anyone who has ever experienced a disk-drive failure in the middle of an important project.

Should You Buy One?

Vixen's CP/M and 8-bit microprocessor do have limitations that even the most enthusiastic supporter can't deny. One is the small amount of memory an 8-bit computer can command. Huge spreadsheet programs, such as Symphony and Framework, require 256K to 640K bytes of RAM, while 8-bit computers can directly address only 64K bytes.

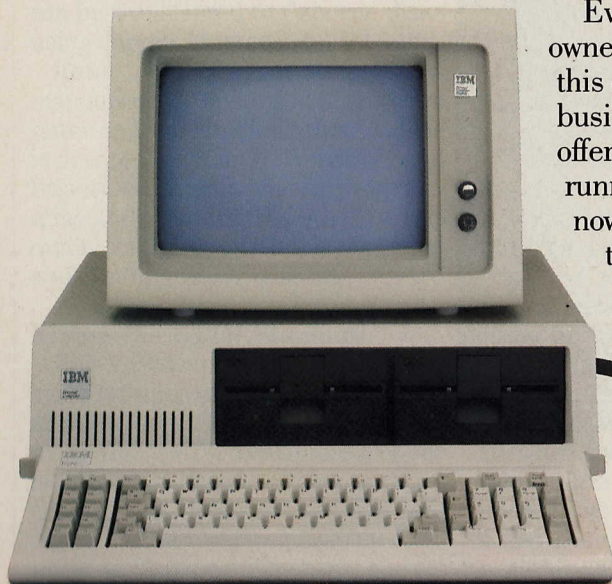
**The next step
for your PC
isn't as big as
you think.**



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IBM System/36 PC.

And you can get traditional PC functions such as spreadsheets and word processing.

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All of this processing power can sit right on a desk or under it—either horizontally or vertically. It measures a mere 21¼" x 16¾" x 6½"—about the size of a small suitcase.

Yet as small as it is, this little box has multiple processors, with main memory that can be dedicated to running your business functions. In plain English, this means you can get better response time. The System/36 PC comes with a 2 MB diskette drive and either 10 or 80 MB disk storage, depending on your information storage needs.



Easy to use.

The System/36 PC is easy to learn and to use. If you need assistance, it has over 2,800 "help" screens that take you step-by-step through any rough spots. You can merge data you've generated on your PC with information that's on your System/36 PC. And you can share information that is stored in the System/36 PC with other attached IBM Personal Computers or System/36 terminals.

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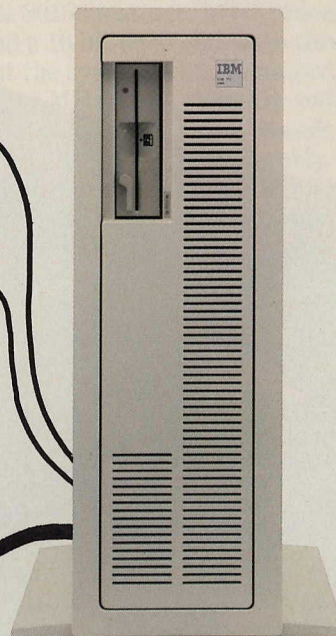
Then there's the original System/36—the 5360 processor—the largest member of the System/36 Family, which can handle up to 36 personal

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IT'S A BOLDFACE LIE



Moreover, 16- and 32-bit microprocessors devour numeric data at twice and quadruple the speed of the Vixen. Even worse, because of the current popularity of IBM PC-compatible computers, most of the new software developed each year is designed for those systems.

Vixen's Virtues

Vixen offers some potent arguments in its own defense, though. One of these is the fact that WordStar runs almost twice as fast on the Vixen as on the IBM PC. The screen refreshes almost instantaneously when changed, and procedures requiring frequent disk access take only half as much time as the same procedures do on the IBM PC.

Another argument is the common-sense fact that many people don't need those very large spreadsheets and, in fact, find them difficult to manage. Vixen's 63-column by 254-row worksheet is adequate for many computer users. And proven CP/M software is in good supply, despite the fact that it isn't heavily advertised in glossy magazines. Much of it is free, available from user's groups that have been around since long before the IBM PC was even a sketch on a Boca Raton drawing board.

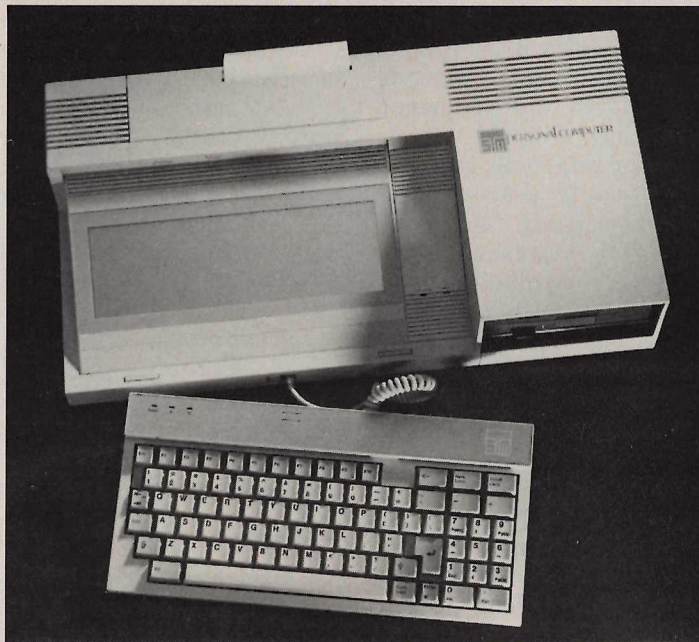
Vixen's only weak point is a lack of good graphics software. It's a snap to set up and use, and the \$1298 price tag shouldn't damage anyone's pocket, especially since it includes all the necessary hardware and approximately \$750 worth of software. It won't really matter to the average user whether the computer is running CP/M or MS-DOS.

A New Start?

Vixen is appropriate for business use at home or while traveling, and in the office it could serve as a terminal or portable adjunct to already installed equipment. In a very small business and equipped with the hard disk, Vixen could stand alone. In fact, it could very well give Osborne Computer Corp. the fresh start it needs.

—TAN A. SUMMERS

Tan A. Summers, who lives in New Orleans, Louisiana, is coauthor of *1,001 Things You Can Do with Your IBM PC*.



The STM PC Portable

*A full-featured transportable
IBM PC-compatible that rivals
many desktop computers*

An ideal computer would be lightweight, fast, and have just about every conceivable expansion option built in. The STM PC Portable from STM Electronics Corp. was obviously designed with these criteria in mind—it's a powerful and versatile machine in a small package. In fact, the 17-pound transportable offers more features than most desktop computers.

The STM PC reflects the four-year-old Toronto-based company's "total-system" approach to design: developing full-featured products. But a dazzling list of features isn't enough—they all have to be useful and they must work. Unfortunately, some of the STM PC's features don't function particularly well.

Much of this computer's power comes from its 80186 central processing unit (CPU). Unlike the slower 8088 CPU used in the IBM

PC and many compatible systems, the 80186 features 16-bit processing and a 16-bit-wide data path throughout the system. This, combined with the 8-MHz clock (roughly twice as fast as an IBM PC's), speeds program operation considerably. One obvious and visible benefit is the extremely fast graphics display refresh rate, compared to the much slower IBM PC.

The drawbacks? The STM PC isn't 100 percent compatible with the IBM PC. STM confronts this problem with additional BIOS (basic input/output system) information that loads from the operating system disk during boot-up. This feature allows most software written specifically for IBM's PC-DOS to run without a hitch. But to benefit from these extra BIOS instructions, you must start the system with a special STM DOS disk, so software that re-

quires you to reset the computer from a program disk prior to running the program may not work on the STM PC. (Intuit by Noumenon Corp. is one such program.)

Most PC software will run, but you should check your favorite programs—particularly those with graphics—before purchasing the machine. Two of my graphics games would not operate, but several others ran without a problem. (Incidentally, the company is helpful if you have questions.)

Communications

A communications program included on the STM DOS disk lets you store telephone numbers that the system can later dial with its built-in telephone/modem. It also dials on-line databases, such as The Source and CompuServe, and receives calls as you work on other programs.

However, the telephone is sensitive to the program running in the background. If the resident program uses some of the same memory locations as the telephone, you'll have trouble. The phone worked fine with Infoscope and NewWord, but not with two popular programs I tried, Electric Desk and Samna III. Of course, you can quit an application program to make a phone call. In fact, to use the phone directory stored on the system disk you must return to the operating system's command level.

The system's built-in hands-free telephone needs improving. Like most hands-free telephones, the STM PC operates in simplex mode: it can send or receive, but cannot do both at the same time. But the automatic switching between send and receive is slow (the first word you speak can't be heard on the other end), and you must stay near the computer and talk loudly to be understood. To make matters worse, the cooling fan on my machine created an annoying high-pitched whine that the built-in microphone picked up. However, the company says it has replaced that fan with a quieter one on subsequent models.

The standard 300-baud internal modem and communications software work fine for dialing on-line

database services. But the program will not automatically log onto an on-line database with your individual terminal, account number, or password. Essentially, it is little more than a glorified auto-dialer and phone book; once you are connected, the rest is up to you. However, it does support direct data transfer via a cable to other STM PCs at 1200

**THE STM PC
performed speedily:
about 25 percent
faster downloading
and 100 percent
faster internal
processing than
the IBM PC.**

baud. Also, STM offers an optional internal Hayes-compatible modem for \$350.

Memory Misgivings

After you load the additional BIOS and communications software, the system's 256K bytes of RAM shrink to 192K bytes of user memory. This causes problems with programs written for 256K-byte environments. Programs that require more than 192K won't run; others needing close to that amount may not be as efficient. The Samna III word processor, for example, runs much more slowly on the STM PC than on an IBM PC with the same amount of RAM. On the STM PC, Samna III must access the disk frequently for program overlays that otherwise would load in RAM at start-up.

Furthermore, even the least memory hungry of the new integrated software programs will fill virtually all available RAM in the STM PC with program code, leaving little or no room for data. For example, loading Electric Desk left only 3K bytes for files. Realistically, you'll have to increase the standard RAM for effective use of programs for

256K-byte machines.

But if you decide to do so, there's a catch. Because of design constraints, RAM is available only in the standard 256K bytes, and STM offers only one RAM upgrade—a \$500 dealer-installed memory kit that doubles the amount of RAM to 512K bytes. Most other MS-DOS-based systems offer easy memory expansion, by the user, in increments as small as 64K bytes.

STM offers a choice of disk drives: either two IBM PC-compatible 48-track-per-inch, 360K-byte drives or two quad-density, 96-tpi, 720K-byte drives. The higher-capacity drives will read standard 360K disks but won't write to them. In most cases, when you don't need to write back to copy-protected 360K-byte software disks, this should work well. You simply transfer your programs to a disk formatted for the high-capacity drives.

In my timing tests the STM PC performed very well. It was about 25 percent faster on downloading and 100 percent faster on internal processing than the IBM PC. The disk drives, however, make an annoying and fairly loud click when they activate—a sound produced by the lock that prevents removal of a disk during drive operation.

Multi-talented Display

The STM PC's diverse display options are perhaps its strongest feature. It comes with a backlit, variable-contrast LCD panel with a resolution of 640 by 200 pixels. However, at 10 by 3.3 inches, the LCD panel has a "low aspect ratio": the graphic images are somewhat squashed, and the alphanumeric lines are crowded.

You can change the display from normal to inverse for boldface and other special attributes, although there is no on-screen indication of underlining. The backlit panel does improve readability under dim lighting, but the shallow display angle produces considerable glare under normal lighting. Even with the back-lighting and variable contrast, you may have to lean forward uncomfortably for the best viewing angle. To overcome this irritating problem, STM suggests placing the computer

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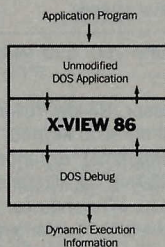
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8PC

POPULAR REVIEWS HARDWARE

on an inexpensive printer stand that tilts at 20 or 25 degrees. This is a novel solution, but a tiltable display would be more satisfactory.

Through an IBM PC-compatible video port on the back you can connect either an RGB or a high-resolution monochrome monitor. There's also a connector for composite video output to drive an inexpensive black-

character matrix from the standard 8 by 8 pixels up to 8 by 9, or 9 by 9, for slightly better resolution. And you can select line widths of either 80 or 40 characters.

There's still more. Using supplied software drivers with a high-resolution monochrome monitor, you can switch to 720 by 350 monochrome graphics for such programs as

ment works fine—it's easy to adjust to their location. Alphanumeric and function keys are the standard size, but others are larger than their IBM PC counterparts. The oversized return key, for example, is easy to find.

Three LEDs atop the keyboard signal power on and which drive is running or was used last. Caps Lock and Num Lock indicators would be more helpful, and the company says this design change is under consideration. Storing the connector cable in its small compartment in the keyboard back is a minor problem, and the compartment door is quite flimsy.

Unfortunately, the built-in thermal printer is less functional—it's slow and noisy. It took a full 13 minutes to print a simple two-page document in its sideways 80-column mode. Hoping 40 columns would be faster, I started to prepare another document for printout. But the word-processing program recommended by STM, NewWord, does not support the 40-column mode. And even though the instructions say you can stop or pause the printer from the keyboard, once it began I was locked in for the whole noisy ride.

The Outside World

Fortunately, connecting another printer should be no problem. Included are two RS-232 serial ports and a parallel printer port. Other ports for linking to the outside world include connections for a standard telephone and an acoustic coupler. A hard-disk interface accommodates 10-megabyte and 30-megabyte models from Xebec. An expansion bus, at the moment, is just a nice-looking connector that doesn't do anything. STM is developing and hopes to market electronic devices for such laboratory applications as timing devices and analog-to-digital converters.

Indeed, the STM PC is a versatile and powerful computer, and it's small enough to carry from office to home or across the country. But I got the feeling that STM has perhaps tried too hard to be all things to all people.

—DAVID C. KEITH

David C. Keith, MBA, frequently writes about personal computers.

AT A GLANCE

The STM PC Portable

	POOR	GOOD	EXCELLENT
Graphics			
Word Processing			
Spreadsheet Analysis			
Database Management			
Telecommunications			
Program Development			

Reviewer's Note:

One of the lightest transportable computers, the STM PC Portable was the first to offer a backlit liquid crystal display, which makes the display easier to read than other LCD screens. The high-speed 80186 CPU and true 16-bit data path allow the running of most popular IBM PC-compatible business software at significantly faster speeds.

Manufacturer: STM Electronics Corp., Suite 250, 535 Middlefield Rd., Menlo Park, CA 94025; (415) 326-6226

Standard Features: 8-MHz 80186 microprocessor; 83-key, full-travel keyboard including 10 function keys and integral numeric keypad; 256K bytes of RAM (192K bytes available for user programs), expandable to 512K bytes; variable contrast, 80-column by 25-line, backlit-panel LCD with 640- by 200-pixel graphic resolution; I/O connector and display drivers for high-resolution (640 by 200 pixels in 4-color graphics mode) and low-resolution monitors (RGB and composite video), and high-resolution monochrome monitor; two double-sided, 5¼-inch floppy-disk drives storing 360K bytes each; MS-DOS 2.0; parallel printer port; two RS-232C serial ports; external I/O bus expansion port; external hard-disk drive connector; internal 300-baud modem; a hands-free, adjustable-volume telephone; internal 40-column thermal printer with 80-column sideways print capability

Dimensions: 20.3 by 10.8 by 4 inches; Weight: 17 pounds

Base List Price: \$2759

Options: NewWord word-processing program (\$295); Hayes-compatible, 1200-baud internal modem (\$350); dealer expansion to 512K bytes of RAM (\$500); soft carrying case with software pocket (\$100)

and-white monitor. You can easily select which display you want from the keyboard.

With a color monitor connected, the STM PC performed quite well. As a plus, the color output provides 16 colors in the 320 by 200 graphics mode and four colors in the high-resolution 640 by 200 graphics mode while still maintaining IBM PC graphics compatibility. Also, using a color monitor, you can switch the

Lotus's Symphony. In short, the STM PC's standard equipment offers just about any display option you'll probably need.

Clean Keyboard

The Selectric-like keyboard layout is excellent. The function keys are the only irregularity; they are placed horizontally above the alphanumeric key cluster instead of on the left side of the keyboard. But this arrange-

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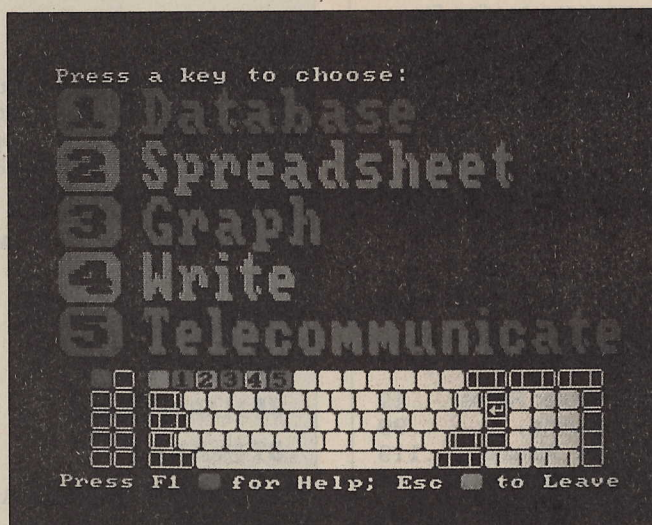
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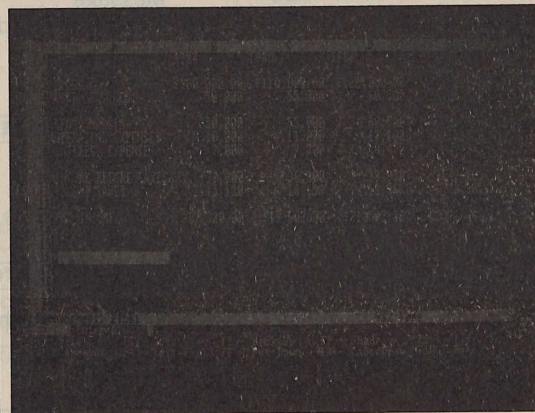
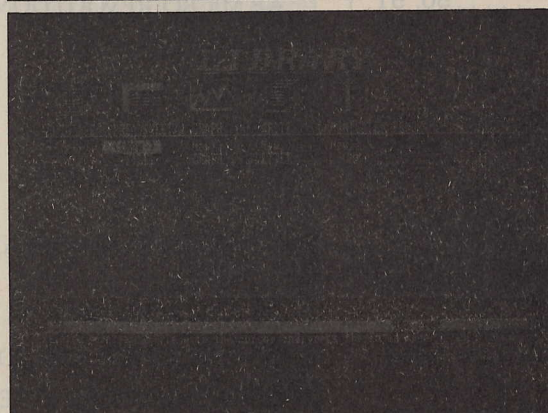
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POPULAR REVIEWS SOFTWARE



ABILITY'S MAIN MENU (LEFT) DIRECTS YOU TO THE PROGRAM'S VARIOUS MODULES. THE LIBRARY SCREEN (BOTTOM LEFT) IS THE CENTRAL AREA FROM WHICH YOU CREATE NEW FILES, ACCESS EXISTING FILES, AND READ IN NON-ABILITY FILES. ALL CURRENT FILE NAMES ARE LISTED UNDER THE APPROPRIATE HEADINGS. AT BOTTOM RIGHT, A VIEW OF THE SPREADSHEET.



Ability

*The integration is smooth and easy
but the power and utility aren't quite up to par*

The concept of integrated software is appealing: you buy one package that takes care of everything. A number of software developers have tried to cash in, some more successfully than others, on this very basic attraction. But despite the appeal, the marketplace has not received integrated software as warmly as expected. We see two main reasons for this.

First, in many instances, integrated software is difficult to learn. But this shouldn't be surprising given the increased scope of an integrated package. Second, integrated software is also perceived as costly, both in initial price and in the amount of RAM required.

Ability, a new entrant in the integrated market, is billed as easy to use and inexpen-

sive to implement—the answer to Symphony and Framework. Xanaro Technologies' aggressive advertising campaign, launched well in advance of the product's actual release, focused on these two key market concerns.

But because Xanaro entered the race so late, about three-quarters of a year after Symphony and Framework, and because of the lukewarm reception given to integrated software, we felt that Xanaro must have had something special to justify the large promotion expenditures.

And it turns out that Ability has some strong points: it's laudably easy to use, requires only a comparatively modest 256K bytes of memory (although with 256K you can't run the graphics module; 320K are recommended), and achieves a high level of in-

tegration. However, because Ability lacks some important features, operates slowly, and brings no applications innovations to the market, it is little threat to the heavyweights. What Ability saves you in money and learning time is offset by its lack of power and utility.

As a result, you should examine Ability's features with unusual caution before deciding to buy.

Library

Ability is organized around a concept called the Library, one of the program's more useful and innovative features. Essentially a DOS shell, the Library organizes Ability files by application. All database files are listed alphabetically under the database column heading. The same holds true for spreadsheet, graphics, word-processing, and telecommunications files. (Ability's sixth module, Presentation, lets you create on-screen "slide shows" using screens you've created with the other modules.) The Library also has space for displaying other programs and files that weren't created with Ability.

The Library gives you access to DOS commands ranging from simple utilities such as Copy, Rename, and Erase to the more sophisticated ones that allow you to manipulate subdirectories. The Library also is the door to Ability's macro facility with which you can create and maintain up to 30 macros at one time. Ability doesn't possess the programming capabilities of Symphony's Command Language or Framework's FRED programming language, however.

What makes the program so easy to operate is its consistent use of function keys across all modules. Basic commands are tied to the function keys, which are displayed at all times on the bottom of the screen.

One of the more interesting commands is the Flip function, which moves you between the two applications that Ability allows you to have active at one time. The Flip key makes it extremely easy and intuitive to cut and paste between applications. In addition to the function-key commands, Ability has a slew of other commands, many of

which are specific to individual modules. The F2 key is a gateway to nested menus of other commands. As you highlight each command, a brief explanation appears at the bottom of the screen.

Ability has plenty of well-written on-line help, but it's not readily accessible. The help facility is not on the help disk but on the system disk. The

AT A GLANCE

Ability

Manufacturer

Xanaro Technologies Inc.
Suite 815, 321 Bloor St. East
Toronto, Ontario M4W 1G9
(416) 927-8369

Price and Hardware Requirements

\$495; IBM PC and compatibles with 256K bytes of RAM (320K recommended), two disk drives, color monitor, or monochrome monitor with a graphics card.

Reviewer's Note

Although easy to use, Ability sacrifices too much functionality and power to be considered a serious contender in the business or integrated software market.

start-up procedures require that you boot with the system disk and then replace it with the help disk. The help disk remains in drive A while the data disk is in drive B, so when you ask for help you have to remove the data disk from drive B and insert the system disk. This is a tedious procedure and also dangerous in the sense that the program doesn't remind you to remove the system disk and reinsert the data disk. Ability let us "enter" all kinds of records with the system disk where the data disk should have been.

Ability's spiral-bound manual is well organized, well designed, and clearly written, but it tends to be a bit condescending on occasion in its effort to be clear.

Word Processing

Write is the focal point of the program and clearly the strongest of the modules. It contains all of the standard editing and formatting features you'd expect to find, such as move, copy, search and replace, and you have control over page lengths, margins, and tabs. Among the less standard features are the ability to set variable margin widths within

one document, display a variety of type styles on-screen, and set headers and footers with a few simple keystrokes.

Beyond that, Write lets you import text from another document, include a spreadsheet and a graph in a document, use database information for a mail-merge function, use spreadsheet data to build a table, and create spreadsheet-like cells—called fields—in a document. While other integrated products (such as Smart and Enable) give you a similar function, Ability's field function is far more powerful. Ability's fields can be used not only to add, subtract, multiply, and divide, but also to call information from an Ability spreadsheet, access Ability's built-in spreadsheet functions, and refer to information in other fields within the same document.

Unlike some other integrated packages, Ability loads the actual spreadsheet into the word-processing document. This means that changes you make in the spreadsheet in Write will be reflected in the spreadsheet in that module.

Ability also loads the actual graph into a Write document and redraws the graph whenever the data on which it's based is changed. You can shut off the automatic redraw feature from within the Graph module.

Spreadsheet

Ability's spreadsheet is a study in contrasts. In some ways it's fast, in others slow. It has several very powerful features, but lacks some of the basics.

Ability's spreadsheet extends from A1 to ZZ9999 giving (theoretically) more than 7 million cells to work with. We placed entries in the four corners of the work area and still had more than 80 percent of available memory free. Unlike 1-2-3 or Symphony, Ability does not map white space (blank cells located above and to the left of cell entries) in memory, thus allowing the creation of larger spreadsheets.

Ability follows the classic VisiCalc/1-2-3 method of cell referencing, with letters denoting columns and numbers for rows. In a break from the standard, Ability refers to

spreadsheet cells as fields. In addition to the function-key commands all the modules share, the spreadsheet has a few powerful advanced commands of its own, like Transpose, which allows a shaded area to be flipped horizontally or vertically, and Consolidate, which allows you to add, subtract, multiply, or divide the values in one spreadsheet by those in another.

Ability allows you to define one-way and two-way links between fields within a spreadsheet or between two spreadsheets. A one-way link is common enough and sets up a relationship between two fields where a change in the value in the original field affects the value of the linked field but not vice versa. Less common, a two-way link makes both the original and linked values sensitive to changes in either of the other fields.

Ability's spreadsheet exhibits an annoying quirk. When you've completed a function using the F4-Edit key to alter formats, for example, the program doesn't return you to the Ready mode. Instead, you must hit the Esc key twice to regain control of the keyboard. The problem of extra keystrokes is also evident in other application areas.

Ability's inconsistent behavior continues in its speed of performance. On the one hand, benchmark tests showed Ability to be quicker than two well-known heavyweights in recalculations, but in everything else—even elementary operations such as moving the cursor around a full spreadsheet and copying, moving, and erasing data—the spreadsheet's most distinguishing characteristic is its relative sluggishness.

Ability supports the four basic graph types: bar, stacked bar, line, and pie. In addition, you can overlay graphs of different types.

You can create a graph in two ways. You can select Graphics from the Library menu and type in directly the numbers and labels. Ability allows up to seven data series at the same time. Or you can create graphs from spreadsheet data.

Ability lets you modify a graph as easily as you create one. You can add titles and axes labels, fill patterns for bars and slices, and rotate

the graph 90 degrees. To link a graph to a spreadsheet, you reference the spreadsheet name and data range in a formula in one of the graph data series.

Menu selections make graph printing and plotting a straightforward affair. Handily enough, Ability's Quadrant option allows you to pick the corner of the page in which you

ABILITY is
easy to use, highly
integrated, and
requires a rather
modest amount of
memory, yet it
brings no innovation
to the marketplace.

want to print the graph, an uncommon but not uncommonly useful feature.

Again, as in the spreadsheet module, Ability displays a curious omission in its command structure. We were not able to find a way to create a graph legend to identify the various data items being graphed. An unsatisfactory "solution" to this problem is to cut and paste the graph into the word processor and create a legend there.

Database

The database manager, like all other modules within the program, places a premium on ease of use. The first step in creating a database is designing what Ability calls the "Master Form," which is simply a fill-in-the-blank form you design. Ability's word-processing features assist you in preparing a visually aesthetic form. When you are ready to define a field, you call up the database menu, select the Field option, and give the field a name. Then you use the cursor keys to define the field widths. In a matter of minutes, you'll have a professional-looking data-entry form.

Upon creation of a data-entry

form, Ability places you in the Add mode where you can enter records into the database. At the bottom of the screen, Ability displays a data-entry prompt comprised of the word Enter and the field name. One annoying feature about data entry is that you must press the Return key twice—why twice instead of once?—to enter information into a specific field. You can also hit the Tab key once instead of the Return key twice.

Additional features include multiple key sorts, creation of data subsets, and a variety of report forms. Reports can reflect the layout of your master form, be a standard row and column layout, or be merged with a Write document. Most of these command sequences are executed simply by filling in a copy of your master form with the appropriate parameters.

Advanced database features include calculated fields, referencing information in an Ability spreadsheet from a field in the database, and moving data freely between the database and spreadsheet. Further, Ability has a consolidate feature that creates a second database that is the sum of all common numeric data in an indicated field. A good application for this would be to determine sales by region in a database that contains all of a firm's sales invoices.

While the Ability database manager is easy to use, we suspect that even the first-time computer user will find the product to be exceedingly slow in execution. Almost every time you select a menu option or move the cursor, Ability goes to the disk for either more program code or data records.

Communications

Ability fares well as a telecommunications tool through a simple and easy-to-use interface and a surprising range of features. An added plus is the user guide—one of the better beginner tutorials on PC communications that we've seen.

Ability handles the usually complex communications setup chores by having you fill in two screens: Port and Terminal settings. To make any changes you simply hit the Return key and Ability automatically flips through all the valid options.

To capture a telecommunications session, just select Capture off the menu and enter a file name. You can then load the newly captured text into the word processor for editing.

Transfer of data with other computers is handled in two ways. Plain ASCII text files (like those created by Ability's word processor) are sent using the List command. For non-ASCII files (binary), Ability supplies its own proprietary protocol. The send and receive commands use this protocol and allow the untended transmission and reception of one or more files.

Overall, Ability's communications capabilities are quite respectable, but there are two key weaknesses. First, Ability does not support the Xmodem protocol. Therefore it is not possible to transfer non-ASCII files with others unless they're also using Ability. Second, you cannot type messages on the terminal screen when you've already executed commands to send or receive files. You first have to change the Local Linefeed and Duplex settings on the Port settings screen.

Ability fails to introduce anything strikingly new in any of the modules discussed thus far, but it does come up with something unique in the application called Presentation.

Presentation allows you to take "snapshots" of screens and store them for later playback as in a slide show. You can enhance these snapshots with music, text, and symbols, all through menu selections.

Presentation maintains Ability's admirable consistency in both function-key definition and command structure. Setting up a slide show is a snap. As interesting as it is, however, our overall opinion of Presentation is that it is different and cute but not sophisticated enough to be useful in a business setting.

A Serious Contender?

Ability did not live up to the performance we expected based on Xanaro's ad campaign. While we must compliment Xanaro on advertising prowess and slick packaging, we have to conclude that Ability does not bring any new and exciting capabilities to the marketplace.

While Ability may be easier to use

than other integrated products, the trade-off in decreased speed and functionality is not worthwhile. Further, although Ability can load and run with only 256K bytes of internal memory, access to applications is limited and it does so at the cost of disk swaps and numerous disk read/write delays. Ability clearly requires a hard disk to operate at an acceptable speed or to conveniently access the help or Presentation facilities.

It is unclear why a software vendor would enter the integrated mar-

ketplace so late with such an undistinguished product. It is doubtful that even Xanaro's well-financed promotional campaign can compensate for Ability's shortcomings. We do not see Ability becoming a serious factor in either the integrated software or general business applications marketplace.

—PAUL GOLDNER, RAYMOND HOOD,
AND MICHAEL WILDING

Paul Goldner, Raymond Hood, and Michael Wilding are president, treasurer, and chief executive officer, respectively, of Microtek Enterprises.



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Friday	Who	Status 17 24 31	7 14
Research	Ma		
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Edit	Ed	C	

What: [Research] (Fixed Date, ASAP, ALAP, Span)
Start Date: [30-Jul-84 9:00am] plus [2] (Minutes, Hours, Days, Weeks)
= End Date: [1-Aug-84 9:00am].
It is (Future, Started, Done)

Who is needed for this? Choose any of the following:
Ma Ed Il Ph I1 I2

Notes: [Research Louis Pasteur's application of the scientific]
[revolution to the wine industry.]

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Priority: (XLow, Low, Med, Hi, UHi) Summarizes other schedule: []

Task Form

Time Line

*This project manager for the IBM PC
more than gets the job done*

Project management is the supreme juggling act. Most managers find themselves charged with the often Herculean task of distributing the finite resources (in a business sense) of time, money, and people in a way that gets a job done on time and within budget. Many managers are still working in the past, drawing charts and filling in text by hand.

Project management software can plo p these workers into the present and give them the efficiency that comes with embracing a proven technology. Time Line helps you keep track of projects, giving you a means to manipulate tasks and time and cost estimates. Easy to use, Time Line helps you track the accuracy of those estimates and make changes in your plans to reflect changes in the real world.

Like many microcomputer project management programs, Time Line uses both Pert and Gantt charts to illustrate the interdependence of tasks in a project.

Although Time Line depends on graphs and charts to communicate with you, it does not require either a graphics monitor or a graphics

printer. (We reviewed Version 1.1. Version 2.0, available by the time you read this, reflects changes suggested by users in some of the finer points in allocating resources, in costing categories, and multiple schedule management.)

Time Line uses the Critical Path Method for determining the most efficient way to get a job done. The CPM involves monitoring those tasks that must be completed by a certain date to ensure the timely completion of the entire project.

When working with large projects, it is often difficult to tell when an overdue task will result in an overdue project. Time Line, sentry-like, warns of late finishes as soon as the critical path is affected sufficiently to cause project delays. Further, you can highlight the critical path to discern the offending task.

Before you actually begin committing your projects to electronic media, you might consider working your way through the tutorial, which demonstrates the development of a sample project.

Seven easy-to-follow and entertaining sessions put you in the shoes of a vineyard owner and have you try

most of Time Line's commands. An audiotape prompts those who'd rather learn by listening than reading. The tutorial's index is helpful.

Time Line is menu-driven, but you can avoid the menus in some instances by using the function keys to perform 19 of the most common commands (the Alt key is used in conjunction with 9 of the function keys to provide all 19 options). To assist you in remembering the use of these keys, Time Line comes with a Quick Reference Guide that describes the uses of special keys and procedures for performing common tasks. And context-sensitive help is available at any time. Time Line's 166-page manual includes many screen displays and helpful hints.

You create a project management file and interact with the program by entering information in a series of forms, which are, in essence, groups of questions that you answer to describe your projects.

Impressive in terms of numbers, Time Line supports projects with up to 1000 tasks, but for that you need 640K bytes of internal memory. With 256K bytes of memory, you can create projects with about 100 to 150 tasks, and with 512K projects can contain about 700 tasks. You can have 16 resources per project and you can assign all 16 to each task, if needed. Hard-disk owners will see an increase in speed of operation, but tasks are limited by RAM, so 1000 is the limit.

The project-definition form is the first one you meet. With it you name and describe the project and indicate a DOS path name for locating the file on disk. You also specify how many (up to eight) old copies of the project you want to archive on disk. Once these preliminaries are out of the way, you move on to the who, what, when, and where.

With the Task form you give each task a name and specify the estimated duration, personnel resources required, estimated fixed and variable costs, priority, and notes. In addition, you must identify the task type as Fixed Date, ASAP, ALAP, or Span task.

Fixed-date tasks are scheduled according to a starting and an ending date. Time Line will reschedule a

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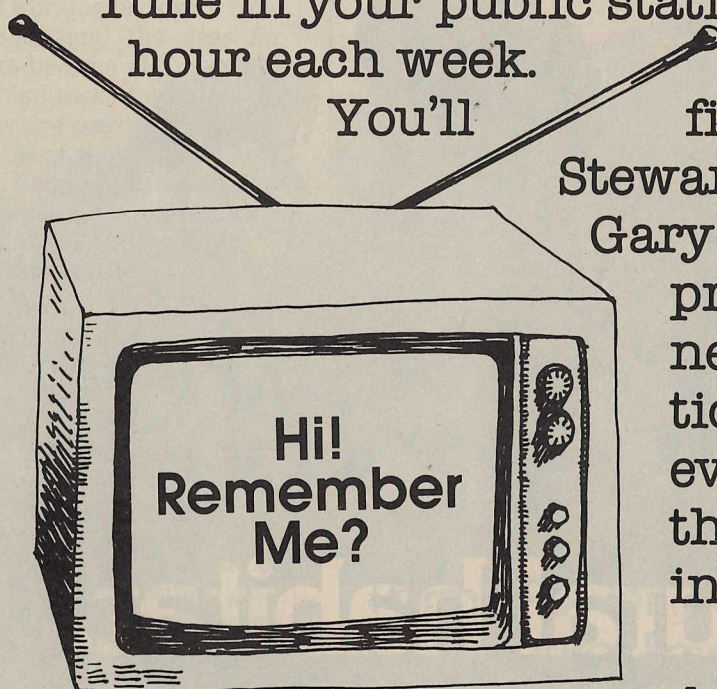
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Fixed-date task only if you have not completed a prior task on which the Fixed-date task is dependent or if the resources are not all available.

ASAP tasks will automatically be scheduled and rescheduled to start as soon as any tasks on which they are dependent are complete.

ALAP tasks will automatically be scheduled and rescheduled to start as late as possible before any tasks which are dependent on the ALAP task. If this sounds a little confusing, think of working backward from a set deadline and the uses for ALAP tasks become obvious.

Finally, Span tasks take as much time as they are provided with between the tasks that immediately precede and follow them. Time Line automatically calculates the duration.

The duration of a task can be expressed in minutes, hours, days, or weeks. This duration is used along with calendar information and resource availability, all of which you provide via forms, to determine projected completion dates and amount of slack time. When you need to set a milestone or target date, you simply give a task a zero duration.

You can direct Time Line to schedule tasks based on the availability of resources in addition to critical path concerns. To resolve conflicts between two or more tasks requiring the same resource, you may prioritize each task.

The Task form allows you to define a task as a summary of another project. In effect, a task can call another project that has its own set of tasks. Each summary task can also sup-

AT A GLANCE

Time Line

Manufacturer

Breakthrough Software Corp.
505 San Marin Dr.
Novato, CA 94947
(415) 898-1919

Price and Hardware Requirements

\$395; IBM PC or 100% compatible with 256K bytes of RAM, and either two floppy-disk drives, or one drive and hard disk; color or monochrome display; parallel printer

Reviewer's Note

Exceptionally easy to use, Time Line is ideal for general business projects, as opposed to large construction projects.

Inquiry 10

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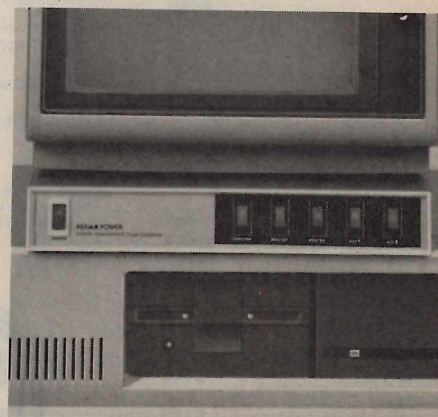
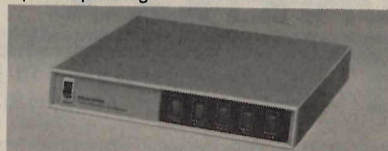
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port 16 resources. And any changes made to the subordinate schedule will be reflected in the master schedule.

The Resources Names form lets you enter up to eight 8-character names that represent personnel resources, either individuals or groups. If you change the name of a resource, all tasks that required that resource will be adjusted to reflect the new name. You can also define a resource as a floater by preceding its name with an asterisk. Floaters, unlike other personnel, may work on more than one task at one time.

The Calendar form allows you to define the number of hours in a work day and a work week, as well as the days worked or not worked in a given month.

The Report form lets you send reports to the printer, a disk file, or the screen. If you choose to send a report to a disk file, you have the option of formatting the file for use with WordStar, Volkswriter, XyWrite II Plus, EasyWriter II, or ASCII files without control characters.

The Partial-join form lets you overlap dependent tasks or add extra time between two dependent tasks.

The Cost form supports eight costing categories for each task. Among the options are the timing for accruals (all at end, all at start, or prorated over time) and the calculations for fixed, variable, and miscellaneous resource costs.

The Gantt chart is your main link to the program. With this chart Time Line graphically displays which tasks have some slack in their schedule, which tasks are critical, which tasks are to be performed in parallel, and which tasks are late. The character graphics used to construct the chart include triangles to mark milestones, underlines to illustrate slack times, and bars to illustrate task durations.

You can control several options for displaying the Gantt chart, including the scale to be used, the amount of space to be used by descriptions and graphs, and which tasks are displayed. This last option is very important because it allows you to highlight or display only those tasks that meet your criteria. Criteria can be based on slack time, start and/or

end dates, resources used, and relationships to other tasks. To pick a complex example, you could choose to display only those tasks for which you are personally responsible, that have no slack time, and which start this month.

When working with the Gantt chart you can access the Pert chart with one keystroke. While the Gantt chart consists of horizontal bars using different shapes to reflect the status of each task, the Pert chart consists of boxes connected by lines. Each box represents a task, and each connecting line illustrates the relationship between the tasks.

Although the Gantt chart is the backbone of the program, the Pert chart is useful for providing an alternate view of your project. You can view the entire chart and its related tasks or only those tasks that you choose to display, either on-screen or printed. Further, the Pert chart is automatically updated whenever the

Gantt chart is updated. You may also modify the Pert chart directly.

Time Line's Report menu lets you print Pert charts, Gantt charts, Cost reports, Status reports, and task Detail reports.

If you manage projects, or manage someone who does, Time Line can be a helpful tool in making projections and tracking performance. Most important, by quickly highlighting trouble spots, Time Line can give you the advance warning you need to acquire more resources, reschedule current resources, or alert superiors or clients that a project is in trouble. In the business world of limited resources where everything means money, Time Line will help you keep vigilant watch over project progress to ensure that you make your deadline within your budget.

—GEORGE F. GOLEY IV

George F. Goley IV is president of Micro Endeavors Inc., a New Jersey-based microcomputer consulting and programming firm.

DATABASE

FactFinder

*This filing system for the Macintosh
lets you call the shots*

Designed as a free-form filing system for the Macintosh, FactFinder is an anomaly in the database world.

Most traditional database management programs impose all kinds of restrictions on the way you organize, store, and retrieve data. They make you define data fields (receptacles for specific kinds of information such as name, address, and account number) and enter data in a specific order to ensure proper information retrieval. As well, they impose field-length limits that often make it impossible or awkward at best to store any amount of text beyond a sentence or two.

FactFinder frees you from these restrictions. The words free-form in its description mean that in its one text field per record you can enter

whatever kind of information you want in any order you want.

Not quite a word processor, not quite a file manager (though it contains elements of both), FactFinder is basically a desk-clearing program. It is organized to help you clear from your desk those stacks of paper in which are buried all kinds of useful information. The program can be used by managers for writing and keeping track of memos, by writers and researchers for keeping abstracts on file, by anyone, really, who has to organize and retrieve data.

FactFinder is built around the concepts of stacks and factsheets. To make an analogy with traditional databases, each FactFinder stack is equivalent to a file in a database, and each factsheet is like a record. FactFinder's factsheets—records—are

not divided into many fields as are those in traditional databases. Rather, each record is one big text field. How big? Well, a factsheet's size is limited by RAM, so on a 128K Mac you can enter about four or five single-spaced pages worth of text and on a 512K Mac you can enter about 12 to 14 pages.

In each factsheet, you identify as keywords as many words or phrases (up to 28 characters each) as you think you'll need for efficient retrieval of data when you want to search through an entire stack—file.

The software imposes no limits on the number of factsheets per stack. The number depends on the length of individual factsheets and the number of keywords you assign to each factsheet. Say you were a manager using FactFinder for generating and filing memos. Given about a 400-word memo with five keys per memo, you could expect to fit about 150 memos on one floppy disk. Researchers or writers working with abstracts could expect to fit about 300 abstracts with an average of 200 words and three keys each in one stack on one floppy disk. A stack must be contained on one disk because the search functions operate on one disk at a time.

Order from Chaos

To take the program to task, I decided to go through my pile of computer magazines and use FactFinder to cross-reference all the articles about word processing. Before beginning, I skimmed through FactFinder's easy-to-read documentation. Unlike the bulky tomes that come with many software packages, the manual is a brief 84 pages. Nonetheless, it is detailed and full of helpful illustrations.

FactFinder requires no installation. Both the program and the operating system are already on the program disk when you get it. There isn't enough memory in a 128K Macintosh to hold both, though, so the disk must remain in a drive as you work. Like most Macintosh programs, FactFinder is much more convenient to use with two drives.

With only one drive, you either save your work directly on the program disk, which has about 60K of

available space, transferring data to an archive (storage) disk when it outgrows the 60K, or you work directly with an archive disk and spend a lot of time popping disks in and out of the single drive as the Mac requests information from the program disk or you try to save data on the archive disk.

The FactFinder program disk contains three working data stacks. The

AT A GLANCE

FactFinder

Manufacturer

Forethought Inc.
1973 Landings Dr.
Mountain View, CA 94043
(415) 961-4720

Price and Hardware Requirements

\$150; 128K Macintosh with one disk drive

Reviewer's Note

This free-form filing system lets you use the storage and data retrieval capabilities of your Mac to satisfy your unique needs.

Examples stack is used in conjunction with the manual's Quick Tour and lets you try out all the FactFinder functions. The Gallery stack offers applications suggestions. And the Hints stack provides information about program functions. The Help menu consists of an assortment of diagrams of FactFinder screen displays. While all of these are helpful in introducing a new user to FactFinder, all but the Hints stack become superfluous once you're familiar with the program. Those working with only one drive might consider transferring the Help, Gallery, and Examples data to a spare disk as this will free up an additional 56K bytes of storage on the program disk.

Working with a two-drive system, I simply inserted a data disk in the second drive and went to work. FactFinder presents the familiar Apple utilities, File and Edit menu headings at the top left of the screen, and continues across the top of the screen with its own Stack, Factsheet, Keys, Utility, and Help menu headings. I pulled down the File menu, clicked on Create Stack, named my stack Magazine Index, and began creating factsheets for each article I found dealing with word processing. That

was about as hard as it got.

FactFinder takes full advantage of the Mac's windowing capabilities. Four windows appear on-screen at once. The Factsheet window takes up the entire left half of the screen and is where you enter new information and view or edit existing factsheets. You can enlarge this window to any size you want, even have it fill the entire screen.

Operational functions take place in the remaining three overlapping windows—Keys, Names Found, and Find In—that occupy the other half of the screen. To make a window active you simply click on it and it's brought to the fore.

Highlighting text in the Factsheet window and then "marking" it via the Keys menu creates keywords that are automatically transferred to the Keys window. Whenever you call a factsheet into the Factsheet window, its accompanying keywords appear in the Keys window.

The Names Found window indicates the total number of factsheets in the stack being worked on and the number found in the most recent search. It also contains a smaller window in which the names of the "found" factsheets are listed. You can scroll through all the factsheets in a stack, highlight a name, and click on the Display button to bring the desired factsheet into the Factsheet window where you can review or edit it.

Finding Facts

The Find In window is used for setting up search parameters. You can search stacks for factsheet names, keywords, and dates. (FactFinder uses the Mac's internal calendar to automatically note the date each factsheet is created and the last time it was worked on.) The program stores this information in an alphabetic index that you can access through the Stack menu. The data in the index is useful as a quick reminder of what's in your files but can also be used to automatically transfer search instructions to the Find In window.

I made "Wordstar" a keyword for a number of my factsheets and "menu driven" a keyword for several others. I clicked on "Wordstar" in

the index, sent it into the Find In window, and requested a search. The names of five factsheets from my "Magazine Index" appeared in the Names Found window. Then using the alternate method of initiating a search, I typed "or menu driven" directly into the Find In window and two more names appeared.

You can perform searches using any number of keywords joined by the operators "and," "or," "to" (used for searches of numbers or dates), or "all," following standard rules for sets and subsets. You can also use wildcards to broaden a search. If I used not only "menu driven" but also "menu operated" and "menu type" as keywords, I could quickly access all factsheets containing these terms by instituting a wildcard search for "menu."

FactFinder is quite flexible and makes it easy to make changes within the structure of your factsheets and stacks. I had created a factsheet describing an article on CP/M in my stack but later decided to make a separate stack for articles dealing with operating systems. With FactFinder's pull-down menus and easy-to-follow screen prompts, I was able to change the name of my stack from "Magazine Index" to "Word Processing," open a new stack called "Op Systems," and transfer the CP/M factsheet from the "Word Processing" stack to the new "Op-Systems" stack intact.

MacWrite Compatibility

FactFinder duplicates most MacWrite editing commands and provides for printing of documents. However, in order to take advantage of sophisticated MacWrite formats or fonts, you'll have to transfer text to MacWrite documents. Parts of factsheets can be moved to or from MacWrite via the Mac's clipboard.

Factsheets can be turned into MacWrite documents and vice versa using FactFinder's Load and MacWrite's Save As Text options, both of which allow you to write text files to disk. However, moving files back and forth between both programs can mean a lot of disk swapping even with a two-drive system—as even the 512K Mac can at present hold only one program in memory at a time.

Although FactFinder was originally released with a copy-protection scheme, the company has since removed any barriers to copying the program. And registered users have unlimited access to product support via an 800 number.

FactFinder was developed as a way to organize random information and it does this very well. It offers a flexibility not available from traditional database and file management software, provides for doing simple tasks like printing mailing labels or

even entire documents (factsheets), and can search through large amounts of data quickly. However, it doesn't possess the potential for printing out complex sorted lists, or the ability to scan text word by word that many true database and file-management programs provide. FactFinder is not a substitute for these programs. But it's not supposed to be. It is, rather, a useful alternative.

—DONNA BARRON

Donna Barron, a freelance writer in Hollywood, Florida, specializes in computer and business topics.



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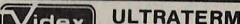
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TELECOMMUNICATIONS

PFS:Access

*The nearly perfect on-line host
gives IBM PC users attractive options*

Well-designed telecommunications software, the programs you use to reach out to the rest of the world through your computer's modem, should act like a good party host: putting people at ease and making introductions, all quietly and with little fuss.

The point of telecommunications programs, after all, is to get one computer talking to another. Once finished with that task, the program ought to fade into the background and let the connection flourish.

I have found myself at some pretty bad telecommunications "parties." There's nothing like a "fatal-error" message or a system prompt popping up during a session on a \$50-an-hour database to ruin a good time.

Happily for telecommunicators of all experience levels, Software Publishing Corp. has introduced a nearly perfect host. Responding to suggestions from users, the company has reshaped its original PFS:Access, which made its debut more than a year ago, into a more powerful on-line host. Aimed at the "first-time, professional business user," PFS: Access Version C is right on target.

The first version of Access, a simple, not very powerful program, ran on Apples and IBM PCs; the enhanced version, which is available now for the IBM PC and selected compatibles (and will be available for other computers soon), adds some very useful new features. PFS:Access now has the ability to let you communicate remotely with another microcomputer and to review information you've downloaded from a remote database even after you've broken the connection. The new version also contains the Xmodem error-checking protocol and an encryption feature that lets you secure your transmissions from prying

eyes. But before examining these changes, let's review the features that made Access worth enhancing.

Simple Sign-ons

Access has always been a snap to set up. During the first session, you identify from an on-screen list your printer and modem and you're off and running. The installation took me less than half an hour.

AT A GLANCE

PFS:Access, Version C

Manufacturer

Software Publishing Corp.
1901 Landings Dr.
Mountain View, CA 94043
(415) 962-8910

Price and Hardware Requirements

\$140 (owners of the older version may buy the updated edition for \$35); IBM PC and compatibles; 256K bytes of user memory recommended

Reviewer's Note

With the easiest sign-on I've seen yet and a variety of useful features, Access is a telecommunicator's delight.

The older version of Access allowed you to store eight telephone numbers in its 10-item main menu. (The other two options were for indicating modem brand and exiting from the program.) The upgrade still has a 10-item main menu but space for only six numbers. The final option, as before, is for returning to the operating system. The three remaining options are gateways to the new features, two of which allow remote communication. The third lets you review a previous on-line session that was captured in a buffer. Modem selection is taken care of as part of the installation procedure.

To dial a number, you simply select one from the menu. Access then delivers you to the next step and the next menu. This subsequent menu

lets you make a few modifications, such as changing names of services and telephone numbers and the baud rate to 110, 300, or 1200. You can also manipulate things like the number of data bits, stop bits, and parity. If all those terms are gibberish to you, don't worry. Access offers reasonable default settings, and when you learn more you will be free to change them—or know enough to leave them alone.

Access's automatic sign-on feature stores your responses during the first sign-on, then takes care of entering all those codes and instructions for you every time you dial thereafter.

When disaster looms—and it's bound to because nasty surprises are a fact of life on-line—you only have to hit the F1 key to get some help. This aid is available practically everywhere in the program and, although it won't help you find your way around obscure databases, it will guide you if you've forgotten how to save something on a disk file or how to use the function keys.

Like most other telecommunications programs, Access offers ways of capturing data into a disk file as it arrives at your terminal from the database. Once this stuff is captured, however, you'll need to use a word-processing program if you want to make any changes because Access doesn't have a built-in text editor.

So far I've concentrated on what made Access worth enhancing. More important are the new features that make it worth buying.

In addition to letting you scroll backward to read material that has already scrolled off the top of the screen and seemingly into oblivion while still connected to a database, Version C lets you go back and review things after you've hung up. The program sets aside about 30K bytes of RAM—close to 20 full screens of information—as a temporary storage area where it automatically saves each session. The storage buffer also gives you the option of saving information you've captured after you've hung up.

The security-minded will appreciate a feature that allows two Access users to send files in code.

More important to me is Access's

ability to allow the remote operation of one personal computer from the keyboard of another. Here's how you might use this feature. Suppose you're a writer who has a hard disk full of files on one computer (say, your office computer) and you want to be able to get at all those files from another computer (say the one you use at home). Before you leave the office, you set up PFS:Access so that it's ready to do your bidding when you call it up. Later, using Access or any other communications program on your home computer, you can call your office computer and begin working with it.

When you're connected with the office machine, you will be asked to enter a password. If you enter the "limited access" password, you will be able to copy files and display directories from your office machine on the one at home. You will also be able to change the default drive on the office machine from, say, C (the hard disk) to A, the floppy-disk drive. Entering the "full access"

password will enable you to use all the file functions just mentioned as well as other, more powerful ones: erase file, rename file, and create or erase a subdirectory.

And when you start transferring files in earnest, you won't be limited to sending just ASCII files. Because Access allows the use of a special error-checking protocol, called Xmodem, you can send and receive machine-language files (these files usually have ".COM" or ".EXE" as an extension to their names). Many bulletin boards require use of the Xmodem protocol for uploading and downloading software.

Every Party Needs a Pooper

I'm happy with the new Access; it should find a wide, enthusiastic audience, but I ought to tell you about the few things that keep it from being the perfect on-line host. Maybe I'm overly nervous about backing up software. I've got four versions of my word processor stashed in various places, for example. But I do feel

uncomfortable with programs that allow only limited copying. Access lets you make just one backup "so follow the instructions below very carefully," warns the manual. Good advice, that. I've blown up more than one master disk in my time.

I'm also disappointed that there are now six instead of eight slots available in the telephone directory. True, most of us don't use more than six services, and the old directory space was shrunk to accommodate the handy features. Still, I like apartments with more rooms than I need, and I like directories with more spaces than I can easily fill.

These are minor disappointments, more than offset by Access's attractive new capabilities. If you've been on the lookout for a versatile, easy-to-use telecommunications program, roll up the rug and crank up the stereo—you're going to enjoy this party.

—JOE ELIA

Joe Elia, a frequent contributor, is the Manager of Publishing Development for the *New England Journal of Medicine*.

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40	4,400	6,500	4,700	3,300	2,700
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42	9,000	30,000	18,000	18,000	18,000
43	5,850	19,500	11,700	11,700	11,700
44	2,100	6,600	6,600	6,600	6,600
45	2,500	2,500	2,500	2,500	2,500
46	500	2,000	1,000	3,000	3,000
47	300	400	500	750	750
48	5,760	5,760	5,760	5,760	5,760
49	230	285	320	335	345
50	7,500	5,000	1,000	1,000	1,000
51	5,000	5,000	5,000	5,000	5,000
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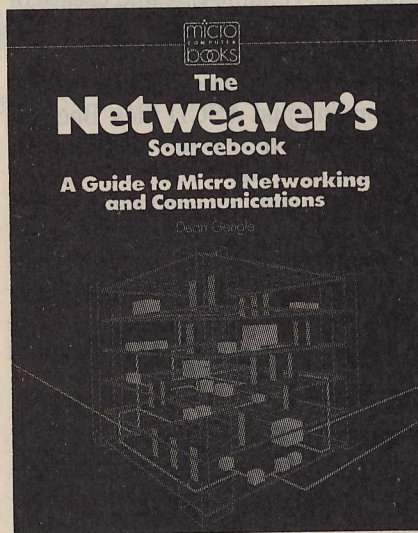
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POPULAR REVIEWS BOOKS

Anyone involved in telecommunications, networking, and bulletin board systems will be interested in the collection of practical information Dean Gengle has assembled in *The Netweaver's Sourcebook*. But while the volume is aimed primarily at those involved in creating and using computerized information networks, its wide-ranging scope and insights broaden its appeal. In addition to its value as a fine hands-on guide for those actively involved in telecommunications, the book also provides satisfying food for thought for anyone interested in the direction this technology is taking.

True to its title, Gengle's book contains a wealth of information on telecommunications hardware and software, phone lines, protocols, and other technical details. Its value as a reference is enhanced by lists of resources such as hardware manufacturers, software publishers, magazines, catalogs, electronic mail systems, and public databases.

But as Gengle states in his Preface, "our scientific and technological powers have far outstripped our moral and intuitive/spiritual and ethical capacities. If the latter do not develop, we have been warned over and over again, we will destroy ourselves with the former." Thus the author examines not only the mechanics of microcomputer communications but also its sociology. Gengle's innovative view of networking takes in everything from politics to morality, from the "Global Village" to family and community affairs, from cybernetics and living



Practical Inspiration

The Netweaver's Sourcebook

by Dean Gengle

Addison-Wesley, Reading, MA, 1984

326 pages, paper \$14.95

systems to the divestiture of AT&T.

This stimulating mix of the inspiring with the practical works well. Gengle's broad, thoughtful perspective provides the impulse, and his technical details furnish the directions. In my own case, both came in handy. The software company I work for is in the process of setting up a customer-service bulletin board system. Gengle's book helped us weave our net and at the same time assured us that the concept itself was worth any headaches its implementation involved.

Naturally, the ambitiously broad focus of *The Netweaver's Sourcebook* entails risks, and the author occasionally falls prey to them. His material is sometimes disorganized, and the relationship of certain topics to his central theme is less than evident. For example, a section of the book titled "Self" treats the following topics: The Culture of the Entrepreneur, Systems Analysis, Systems Design, Privacy, Libel and

Slander, Human Rights, and Transforming the Bill of Rights. In other words, the author sometimes ranges a bit too far.

On the more practical front, readers interested in a communications resource will appreciate *The Netweaver's Sourcebook's* comprehensive index, helpful glossary, and extensive appendices. The first appendix is a bibliography cross-referenced to each section of the text and complete with one- or two-paragraph annotations for each title. The remaining three appendices follow the structure of the text itself, moving from the personal level through

the social to end up with the how-to details. Personal Systems lists magazines, more books, and a variety of organizations related to the field of telecommunications. Social Systems complements the ideas presented in the text by focusing on government agencies and other institutions whose purpose is to bring individuals together. Building and Weaving offers technical details such as the ASCII character set, modem protocols, and the RS-232C standard.

In spite of a somewhat scattered approach, Gengle has succeeded in crafting a book that is both conceptually fascinating and specifically valuable—not a bad job of weaving in itself. I can recommend it not only to those who are actively involved in telecommunications but also to anyone with an interest in the evolving local and global information network.

—DAVID L. SALAHI

David L. Salahi is a freelance writer based in Irvine, California.

MICRO REVIEWS

Winning the Information Systems Game: A Manager's Survival Guide

Nelson T. Dinerstein

Dow Jones-Irwin, Homewood, IL, 1985, 219 pages, paper \$25.00

The corporate jungle is becoming more and more crowded with a new breed of guerrilla fighter, the computer-toting middle manager. Nelson Dinerstein, an associate professor of computer science and author of a few highly regarded books on dBASE II, targets precisely this middle manager with his new guide to "how to use the (personal) computer to get ahead . . . to make a name for yourself in the organization." According to the author, the key is supplementing the corporate database with your own "private information system." Dinerstein guides his reader through designing a system, enlisting the help of a "software technician," choosing appropriate software and hardware, and finally implementing the entire system. Case studies of maverick loan officers, purchasing managers, real estate agents, sales managers, and accountants provide examples, and Dinerstein is at his best when describing these practical aspects. Unfortunately, in a guide that might be more appropriately titled "Machiavelli Meets the Machine," practicality becomes secondary to the more "Princely" pursuits of climbing the corporate ladder, currying favor with higher-level executives, and slanting reports to highlight your own unique qualifications for advancement. But beneath this discussion of the seamier side of corporate politics is an important new guide filled with solid advice for middle managers who are into their own version of distributed processing.

The Hidden Power of Lotus 1-2-3

Richard W. Ridington and

Mark M. Williams

Brady, Bowie, MD, 1985, 283 pages, paper \$19.95

Keyboard macros in Lotus's 1-2-3 allow the creation of fully automated applications that can be used even by those with little or no familiarity

with the software. But ironically, 1-2-3's command language has been conspicuously de-emphasized in the program's documentation as well as in ancillary books. Ridington and Williams' specialized work redresses this imbalance by providing an indispensable practical guide to programming with Lotus keyboard macros. Because the text is aimed at users already familiar with 1-2-3 and the authors' treatment tends to be both haphazard and unsystematic, those who are completely unaware of 1-2-3's potential as a fully automated, customized spreadsheet will gain little from reading it. But experienced users can and will appreciate *The Hidden Power of Lotus 1-2-3*. Once the authors begin to examine macro programming techniques and advanced applications, they find their true calling. Covering topics ranging from techniques for looping to using slider or column ranges (self-modifying macros with variable instructions), this sourcebook is not so much a collection of readily adaptable macros as it is a comprehensive guide to designing, writing, and executing your own customizations.

How to Typeset from a Word Processor: An Interfacing Guide

Ronald Labuz

R. R. Bowker, New York, 1984, 220 pages, paper \$24.95

The Interface Data Book for Word Processing/Typesetting

Ronald Labuz with Paul Altimonte

R. R. Bowker, New York, 1984, 195 pages, paper \$15.00

The author, a typographer by profession, blows the cover off computerized typesetting, one of the best-kept secrets in the area of cost-saving microcomputer applications. With the thousands of books on microcomputer applications published in the last four years—many by means of the electronic publishing methods Labuz describes—it is amazing that it took this long for the topic to be addressed in a popularized format. Producing the type for a book or brochure directly from the output of word-processing software yields savings in time and money so great that one industry projection quoted by Labuz concludes that "by 1993 more than 80 percent of all typesetting

will be interfaced." Labuz's clear, nontechnical primer and companion buyer's guide will certainly accelerate the process. Both sides of the technological marriage are described: computer and typesetting basics, software and hardware selection, direct and indirect interfacing methods, and, of course, potential problems. Where the interfacing guide outlines the options available to the computer user, the companion data book provides a brand-name yellow pages to hardware and software selection, as well as a state-by-state directory of telecommunicating typesetters. As valuable as these books are, they are probably more easily available directly from the publisher than from your local bookstore. But if publishing anything from a newsletter to an encyclopedia is a possibility, the payoff is worth the effort to find Labuz's books.

Data Communications: A Manager's View

John Seaman, editor

Hayden, Hasbrouck Heights, NJ,

1985, 432 pages, paper \$19.95

Although aimed at the professional data communications manager, this collection of articles touches on subjects that are of concern to any business person involved in the implementation and/or use of a local-area network. Seaman's sampler accurately reflects the extraordinary spectrum of policy issues and technological options that bear on network decision making: in fact, the book's primary strength is that, unlike others on the same subject, it recognizes that the outcome of struggles in the corporate arena (IBM versus AT&T, for instance) are at least as germane as the latest offerings in network resource-sharing devices. Concise, informative essays cover topics such as the consequences of the AT&T divestiture, micro-to-mainframe communications options, multifunction modems, and general security considerations. In an area where the players seem to change daily, Seaman offers a readable, state-of-the-art overview.

—MIKE NICITA & RON PETRUSHA

Mike Nicita and Ron Petrusha are coauthors of *The Reader's Guide to Microcomputer Books*, 2nd ed. (Golden-Lee, 1984).

ASK POPULAR

How your monitor differs from your television, and other pertinent answers

A TV PICTURE HAS SMOOTH CURVES and straight diagonals, but the computer CRT image is well known for its sawtoothed edges. Why is this true when the TV tube is supposed to be of lower quality, with fewer pixels and a slower refresh rate?

—RON WEBER
SAN DIEGO, CA

THE ANSWER INVOLVES THE WAY the two images are created. A television generates a video image from a continuously variable analog signal. Each picture can be thought of as a frame created by interlacing two fields. The electron beam "paints" the first field from the upper left corner to the lower right corner with 262 ½ lines; then it starts at the top again, this time in between the first set of lines, and paints the second field. This double painting, which occurs at 60 frames per second eliminates flicker.

The vertical resolution of such a picture is defined by the number of visible horizontal scan lines; the horizontal resolution is defined by the number of elements, or dots, that can be developed across each line. In practice, the vertical resolution is 250 to 350 lines, and the horizontal resolution is about 300 elements.

A digital computer-generated display is composed of a discrete number of elements. Depending on memory requirements, the screen resolution of many computers can be as high as 640 horizontal dots by 400 vertical dots, which is better resolution than the TV. Naturally, the more dots, the smoother the lines and circles will appear. Since the computer display is generally not moving, interlacing is not required to eliminate flicker.

For simplicity we'll answer your question in terms of monochrome displays although the same principle

applies to color displays. The dots on a computer screen can be either on or off (black or white), but the dots on a TV screen can have many in-between shades of gray. A simple example will illustrate the difference more vividly. Assume that an "almost horizontal" line is to be drawn across a computer screen. The line will start at the leftmost dot on one scan line and end on the rightmost dot of the next scan line. Because the resolution can be no finer than one dot, the line will be drawn halfway across the screen with one row of dots, abruptly step down to the next row of dots, and continue to the right edge of the screen. The resulting line will have a characteristic step.

The same line displayed on a TV screen will not have the step. It will start from the same leftmost dot, at full intensity and gradually become dimmer. At the center of the screen it will have half the starting brightness, and at the end of the line it will have no brightness at all. On the next scan line, the line will start with zero brightness, increase to half at the center, and have full brightness at the right edge of the screen. At the center, there will be two lines, each with half brightness. The eye-brain connection of the viewer merges those two lines. This creates the appearance of one continuous line, even though the resolution is the same or less.

The eye tends to merge analog signals more readily than digital signals. In fact, expensive monitors use a technique known as "anti-aliasing" to eliminate steps in diagonal lines. One approach is to defocus or slightly blur the lines so that the eye tends to merge them more easily.

I WANT TO BUY A HARD DISK FOR MY Apple IIe. Some of my software is Apple DOS and some is CP/M;

also, I just bought a program in Pascal, which has its own operating system on the Apple with unique commands. Can I format different parts of the hard disk for the different operating systems?

—PETER HOBBS
WASHINGTON, D.C.

YES. YOU CAN DIVIDE A HARD DISK into several storage areas, or partitions. A partition is a continuous group of concentric tracks. Each can be a different size and contain a different operating system. For example, with a 10-megabyte hard disk, you could allocate 2 megabytes to Pascal, 3 megabytes to Apple DOS 3.3, 3.5 megabytes to CP/M, and the remainder to Apple ProDOS. A utility program, usually supplied with the hard disk, establishes the various partitions much as DOS initializes a floppy disk. Before investing, be sure that your software will load onto a hard disk. Some copy-protected software will not. If you are in doubt, contact the manufacturer.

Hard disks for the Apple IIe include The Sider (\$695) from First Class Peripherals (3579 Highway 50 East, Carson City, NV 89701, (800) 538-1307); the QC-10 (\$1995) from Quark Peripherals (2525 West Evans, Suite 220, Denver, CO 80219, (800) 543-7711); and the Infax 101A (\$2595) from Infax Inc. (5301 Covington Highway, Decatur, GA 30035, (800) 241-1119).

MY WORD PROCESSOR'S COMMANDS for generating boldface, underline, subscript, etc., are not compatible with my printer. I've seen advertisements for the "Printer Optimizer" from Applied Creative Technology, with which you can send the commands to the printer from a 16-key pad. However, this

device has more features than I need. Is there a simpler device I can use to set up my printer for the incompatible commands?

—A. O. THOMAS
WILLIAMSPORT, PA

NO, BUT YOU PROBABLY DON'T NEED one. You can configure most printers for the special effects you mentioned by sending a nonprintable code ahead of the text. For example, on an Epson printer, the code ESC E toggles the printer into the emphasized (or boldface) character mode. The printer will stay there until an ESC F command toggles it back to normal. Such special codes are included in many word-processing programs, as well as in printer-driver utilities. But some word processors won't allow this because the nonprintable codes are used in the command syntax or trapped in the printer-driver routine.

Being able to toggle the printer externally is indeed a nice feature. However, you'd have to be very fast to make changes during printer operation.

The best bet to accomplish what you desire is a better word-processing program.

A FRIEND AND I ARE TIRED OF THE cumbersome disk swapping required to transfer files or save documents on our single-drive Macintoshes. Can we link our Macs and use one of them as an external disk drive?

—NELSON HAUKAP
CARROLL, IA

ONE OF THE EASIEST WAYS TO LINK the Macs is by connecting the serial ports with a "null modem," or modem eliminator. This device is simply a serial port cable with several connections reversed so that the computers can communicate. Such cables are sold by Black Box Corp., POB 12800, Pittsburg, PA 15241, (412) 746-5530 (\$20 and up, depending on length), and Glasgal Communications, 207 Washington St., Northvale, NJ 07647, (201) 768-8082 (\$13 plus 30 cents a foot).

Once the two computers are connected, you can transfer information with terminal-emulation software that uploads and downloads files.

Some of these programs, however, will handle only text files and are not suitable for transferring data.

One Macintosh terminal-emulation program that handles both types of files is MacTerminal (\$99) from Apple Computer (20525 Mariani Ave., Cupertino, CA 95014, (800) 538-9696). MacLink (\$155 with cable, \$125 without) from Data Viz (116 Winfield St., East Norwalk, CT 06855, (203) 866-4944), and PC to Mac and Back (\$149.95) from Dilithium (POB 606, Beaverton, OR 97075, (800) 547-1842) will transfer files directly between two Macs or between a Mac and an IBM PC.

Although it's an added expense, a second disk drive would be more straightforward and require no additional software.

WE PLAN TO BUY A TANDY 1000 FOR our company. Our main application is word processing, and we would like a 14- or 15-inch amber display. Can you list some companies that offer such monitors?

—JAMES SMITH
SEATTLE, WA

POPULAR SCREEN SIZES FOR AMBER monochrome monitors are 12 and 13 inches measured diagonally; they're quite suitable for word processing, and larger sizes aren't frequently advertised. However, a 14-inch black-and-white monitor was marketed recently by Roland DG (7200 Dominion Circle, Los Angeles, CA 90040, (213) 685-5141). The MB-142 (\$375) has a resolution of 720 by 350 pixels, offers black-on-white or white-on-black text, and plugs into the monochrome board of the IBM PC and compatibles.

You also should check with manufacturers of amber monitors. They include Amdek Corp. (2201 Lively Blvd., Elk Grove Village, IL 60007, (312) 364-1180); NEC Home Electronics, Personal Computer Division (700 Nicholas, Elk Grove Village, IL 60007, (800) 323-1728); Taxan (TSK Electronics), (18005 Courtney Ct., City of Industry, CA 91748, (800) 772-7491).

Ask Popular is a monthly column conducted by contributing editors Harv Weiner and Steve Ciarcia to answer general questions about small computers. Send your questions to: Ask Popular, POB 397, Hancock, NH 03449.

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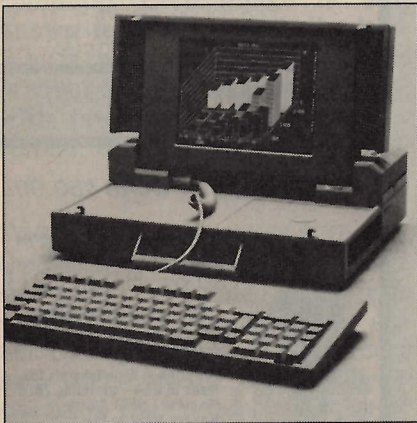
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Hardware



Plasma portable: The Ericsson Portable PC's 11-inch plasma screen generates its own light for viewing at any angle and displays 25 lines of 80-column text. Resolution is 640 by 400 pixels. The basic portable is 12.2 by 15.4 by 4.5 inches, weighs 15 pounds, and comes with 256K bytes of RAM, 5¼-inch floppy-disk drive, and parallel and serial ports. Accessories include memory upgrades to 512K bytes, a built-in thermal printer with graphics capability, a modem, and a port for IBM PC expansion boards. Base price, \$2995. *Ericsson Information Systems, POB 2522, Greenwich, CT 06836; (203) 661-1666. [INQUIRY 200]*

Portable disk drive: The Chipmunk, a battery-operated 3½-inch drive, adds 358K bytes of storage to the Tandy 100 and 200. It operates from the regular menu with one-key-stroke commands and loads a 10K-byte text file in 20 seconds. The drive works up to 10 hours on ni-cad batteries that recharge automatically during AC operation. Comes with bundled software for a database, invoice preparation, sorting, telecommunications, appointment calendar,

and personal-finance management. The compact drive is 7.5 by 5.5 by 2.5 inches and weighs 3.5 pounds; \$599. *Portable Computer Support Group, No. 207, 11035 Harry Hines Blvd., Dallas, TX 75229; (214) 351-0564. [INQUIRY 201]*

Micro drive for Apple: The Tymac MDD-640, a 3½-inch external floppy-disk drive, stores 640K bytes, reduces access time, and is compatible with Apple DOS 3.3 and ProDOS. Drive speed never needs adjustment. The package includes drive, controller card, cable, and reference manual. For the Apple II, II Plus, and IIe; \$419. *Tymac Controls Corp., 127 Main St., Franklin, NJ 07416; (201) 827-4050. [INQUIRY 202]*

Versatile printer: Draft and near-letter-quality text, dot-addressable graphics, a variety of fonts and pitches, and bidirectional printing at 140 cps are features of the 80-column Westrex 1. The dot-matrix printer also produces double-strike, italics, and underlining. The ribbon cartridge lasts for 8 million characters. Includes 2K-byte buffer and choice of serial or parallel interface. Accommodates single sheets or sprocket-fed paper; \$499. *Westrex OEM Products, 51 Penn St., Fall River, MA 02724; (617) 676-1016. [INQUIRY 203]*

Color/monochrome monitor: With the flip of a switch, the 13-inch Tecmar color monitor changes to green monochrome for text material. Designed for advanced graphics applications, it displays 16 colors with 640 by 480 resolution. For the IBM PC and compatibles, \$795. *Tecmar Inc., 6225 Cochran Rd., Solon, OH 44139; (216) 349-0600. [INQUIRY 204]*

Economical daisy wheel: Aimed at users who want letter quality but

don't require high speed, the Juki 6000 operates at 10 cps and prints 90 to 135 columns, depending on selected pitch. Uses single-strike or fabric ribbon, friction feed. Choice of serial or parallel interface; \$295. *Juki Industries of America, 299 Market St., Saddle Brook, NJ 07662; (201) 368-3666. [INQUIRY 205]*

Keyboard with ears: The KB5152V adds speech recognition to normal keyboard input. It enters vocal commands as if they were keystrokes. You can tailor a 160-word vocabulary to your own applications. Recognition accuracy in typical applications is 98 percent. Comes with a noise-canceling microphone, foot switch, and vocabulary management software. For the IBM PC and XT; \$1495. *Key Tronic Corp., POB 14687, Spokane, WA 99214; (800) 262-6006. [INQUIRY 206]*

Printer sharing: Up to eight computers can share the same serial printer with the PSU-81. The unit scans sequentially, locks into the "ready" port and sends data to the printer, then resumes scanning. Uses Ready/Busy handshake signals common to most interfaces; \$595. *Western Telematic, 2435 South Anne St., Santa Ana, CA 92704; (800) 854-7226. [INQUIRY 207]*

Switching printers: X-Changer, a remotely operated parallel printer switch, connects two computers to two printers. It operates in straight-through and crossover positions. Switchbox and cables fit out of sight; a remote-control slide switch mounts on the desk. Signal switching is electronic, and a software-operated version is available for the IBM PC; \$150. *Plex Technologies, 2316 4th St., Berkeley, CA 94710; (415) 486-0686. [INQUIRY 208]*

Computer mailbox: A modem message center, the Signalman Computer Mailbox is designed for small businesses. Provides local and remote access, sending, and receiving. Three programmable passwords ensure communications security. Comes with 64K-byte memory and stores messages whether the computer is on- or off-line. Housed in a modem-sized box; \$299. *Anchor Automation, 6913 Valjean Ave., Van Nuys, CA 91406; (818) 997-7758. [INQUIRY 209]*

Clock and calendar: You'll be on time and up-to-date with dClock for the IBM PC and compatibles. The battery-operated circuit works continuously and automatically enters the date and time when you boot the computer. Attaches easily to the motherboard; \$60. *Microsync, POB 116302, Carrollton, TX 75011; (214) 492-5265. [INQUIRY 210]*

Software

Software network: LanLink is a local-area network on a disk. It eliminates interface boards by programming the controller chip in the RS-232 serial port. Transfers data at more than 115K baud and is compatible with most software. Multiple users can share one hard-disk backup. For the IBM PC and compatibles; \$495 for one server and one satellite module. Additional modules, \$195. *The Software Link, Suite 336, 8601 Dunwoody Place, Atlanta, GA 30338; (404) 998-0700. [INQUIRY 211]*

Letter processing: Express makes secretarial work easier by expediting routine tasks. The economical software package includes memory typewriter, word processor, mailing list, and mail merge. Available soon in foreign-language versions. For the IBM PC, Apple IIc and IIe; \$30. *Mirage Concepts, Suite 108, 4055 West Shaw Ave., Fresno, CA 93711; (800) 641-1442. [INQUIRY 212]*

Macro-maker: With Keyworks, you can combine a sequence of commands into one or two keystrokes. Builds a directory of the macros you

create; pop-up menus make operation quick and easy. Compatible with most business software, including integrated packages. For the IBM PC; \$90. *Alpha Software Corp., 30 B St., Burlington, MA 01803; (617) 229-2924. [INQUIRY 213]*

Software synthesizer: Smooth-Talker for the Apple Macintosh is a software-only speech synthesizer. It converts text from keyboard and files into speech with an adult male voice, and you can change the speed, pitch, and volume. The user-programmable software also can understand abbreviations and mathematical symbols; \$150. *Softeam Inc., 900 West Walnut St., Compton, CA 90220; (213) 604-7400. [INQUIRY 214]*

Integrated accounting: Quartet is a small-business accounting package for the Tandy 1000, 1200HD, and 2000. Menu-driven and function-key oriented, it includes payables, receivables, payroll, and general ledger. Requires 256K bytes; \$400. *Radio Shack, 1700 One Tandy Center, Ft. Worth, TX 76102; (817) 390-3549. [INQUIRY 215]*

Bulletin board: BBS-PC, electronic bulletin board software, provides 16 separate sections for electronic mail, file exchanges, etc. You can restrict a user's read, write, upload, and download privileges for each section. The system automatically reclaims board spaces when data is deleted. Communicates at 1200/2400 baud with most modems. For the IBM PC and compatibles with 256K bytes; \$249. *Micro-Systems Software, 4301-18 Oak Circle, Boca Raton, FL 33431; (305) 391-5077. [INQUIRY 216]*

Layout and design: With ReadySet-Go you can design and print newsletters and brochures, combining text and graphics. You build pages from blocks, resizing and repositioning with the mouse for the layout you desire. Comes with a variety of type fonts and sizes. For the Apple Macintosh; \$125. *Manhattan Graphics, 163 Varick St., New York, NY 10013; (212) 989-6442. [INQUIRY 217]*

DOS bypass: Magic Menu lets you move from program to program

without returning to DOS. You can also create sequence screens to combine a series of commands. The package includes password security and an editor for building and modifying menu screens, and it will also control printers, modems, and other peripherals. For the IBM PC and compatibles; \$99. *DeereSoft Inc., POB 1360, Melbourne, FL 32901; (305) 768-2477. [INQUIRY 218]*

File eraser: Old files on a disk can be a security problem; data remains intact even after Erase or Delete commands until the DOS needs the disk space. The Erasures program is guaranteed to make old files unreadable. It's easy to use; you substitute a "Sure" command for Erase or Delete. For MS-DOS and PC-DOS systems; \$30. *MPPi Ltd., 2200 Lehigh Ave., Glenview, IL 60025; (312) 998-8401. [INQUIRY 219]*

Digital atlas: Computerized Atlas, a world globe in 3-D graphics, supplies information about any point in the world, including population, area, monetary unit, language, latitude, and longitude. You can center an area by entering the country or one of the 3200 cities the atlas recognizes. Zoom level is adjustable. The atlas also gives distances between any two points. For the IBM PC and compatibles with 128K bytes of user memory; \$70. *Software Concepts, 1116 Summer St., Stamford, CT 06905; (203) 357-0522. [INQUIRY 220]*

Better salesmanship: Sell! Sell! Sell! is a two-part sales training and performance package. Training evaluates your skills and selects exercises in weak areas. Applications helps you plan, execute, monitor, and analyze the sales process. For the IBM PC; Training is \$495 and requires a color graphics card; Applications is \$195 and requires two drives. *Thoughtware, Suite 1000A, 2699 South Bayshore Dr., Coconut Grove, FL 33133; (305) 854-2318. [INQUIRY 221]*

New Products provides up-to-date information on recent releases of microcomputer hardware, software, and accessories. Descriptions are based on information supplied by the manufacturers and should not be considered endorsements. If you need additional information, please check your local dealers or write directly to the manufacturers.

Continued from page 62—

clock, a calculator, and monthly and daily calendars. The appointment calendar has preset times, or you can define your own. You can store telephone numbers in the card file and search for records with the speed and efficiency of a dedicated database system. Unfortunately, the Rolodex fields are already defined, though they include most of the categories in a typical card file.

The only drawback to My Desk is its lack of a notepad. Instead, you must use to-do lists for jotting down important items in line-by-line format.

POLYWINDOWS

DESK HAS MOST OF THE INGREDIENTS you'd expect to find in a well-rounded desk-accessory program, minus modem communications and a flexible notepad. The program also includes an unnecessary child's puzzle.

The Polywindows Desk notepad is hampered by size limitations. It can't be expanded beyond 71 columns by 10 lines. But the notepad features automatic reformatting after inserting or deleting text, and there's even an undo feature that recovers any amount of text that is accidentally erased. The latest version of the program (2.0) also lets you import and export text from other applications.

The Polywindows Desk card file uses screen graphics to imitate a typical Rolodex card set. You can create a variety of card sizes and customize your fields. The card file can be searched quickly using an index tab; you needn't worry about upper or lower case or whether you have typed the complete name exactly as listed. It can be printed on continuous-form Rolodex cards or mailing labels, though the printing options are limited to just the current card or the entire deck.

Polywindows includes a macro key feature. With it, you can make one key do the work of many to execute commands or type text strings. The macro key is not as powerful as in dedicated programs like ProKey, but it is more than adequate for simple applications.

POP-UP DESKSET PLUS

OFFERS A WIDE ARRAY of features, though it lacks some basic functions. Although the company claims the program takes only 150K bytes of RAM to run all the features, I found it took 171K bytes. However, you have the option of easily including or excluding any of the features to save memory.

The program has a full-featured clock with alarm, snooze alarm, stopwatch, and the ability to export the time and date to your application program. In addition you can set the alarm clock so that it executes designated keystrokes or runs a program when you're away from the computer. However, the clock is in the military time format.

Pop-Up has an excellent full-screen calendar that mimics an office wall calendar. You can insert annual holidays and other recurring events in any square. You can also print these calendar displays for reference. But, odd as it may seem, the program has no appointment calendar.

The auto-dial and modem features are excellent, although you can store only three numbers for voice calls and three numbers for on-line databases. The modem allows you to import data from the screen and send and receive text files. All that's missing is the ability to turn on the printer while you're on-line. (A less expensive version, called Pop-Up DeskSet, lacks the telecommunications features.)

Pop-Up's notepad is 35 columns wide, but it scrolls down page by page to accommodate a total of 3500 characters. Its clipboard serves as a temporary holding area for text being moved between applications. Neither of these tools works as a stand-alone word processor.

In addition to its standard calculator functions, Pop-Up's calculator has extra options that require more memory. These extras let you calculate interest, annuities, depreciation, and a variety of statistical functions.

One nice touch is Pop-Up's ability to execute DOS commands from within an application. You can call up

a disk's directory of files, copy files from one disk to another, rename files, examine the contents of a file, check remaining disk space, delete a file, or change disks or directories.

You can also print a file from the DOS commands window or turn your computer into a direct-linked typewriter, an excellent feature if you want to address envelopes or make labels. Pop-Up also lets you send special control codes for enhanced typefaces on dot-matrix printers.

SIDEKICK IS THE LOTUS 1-2-3 of desk accessories. In fact, at this writing it is the number-two-selling software package, behind 1-2-3. It's easy to use and offers exceptional flexibility. But it is also missing some essential features and carries extra baggage.

SideKick appears to have been designed with programmers in mind. One feature displays the codes for all 256 ASCII characters. Several RAM-saving versions of the program minus various features are available, but there is no version without the ASCII window. Likewise, the calculator is more complex than most users need it to be, with its hexadecimal and binary computation capabilities.

The heart of SideKick is the notepad, which can act as an alternate word processor. If you use WordStar, you'll be right at home, because the notepad employs many of WordStar's control key commands. Luckily SideKick differs from WordStar in one substantial way—it stores text as ASCII files that can be edited by many word-processing packages. One of Sidekick's best features is the ability to import on-screen data from any application program into the notepad. Word-wrap, automatic reformatting, and the ability to export text have recently been added in version 1.5 of SideKick.

Though SideKick lacks a Rolodex-like card file, you can improvise lists of names and addresses by using the notepad in conjunction with the simple search capabilities of the dialer. The auto-dialer can call any number from your application program as well as any of those stored in your

phone directory text file.

The size and location of SideKick windows can be changed quickly and efficiently with a special setup window. Once you've changed the location of windows, you then store that version on disk for future use. The notepad window can be expanded to fill the screen or be compressed into a small box just 50 characters wide by 3 lines deep. SideKick's appointment calendar lets you create as many different calendars as you like, limited only by disk space. The appointment calendar is in half-hour increments, which is adequate, but I prefer calendars that let you enter variable times. And the program could use a clock and alarm.

THE DESK ORGANIZER

A DISK based desk accessory, requires that you keep the program or "key" disk in the drive when it's in use. The program includes an appointment calendar, filing systems, a notepad, and a telephone dialer. Unlike the other programs discussed here, this program's applications don't come up in windows overlaying your main application. Rather, you switch between The Desk Organizer and your main application.

The Desk Organizer is more complicated than other desktop packages, but it gives you enormous computing power. You can create your own structures for filing and retrieving information or use the program's filing systems to create multiple indexes. One index might be your appointment book, another a to-do list, a third your Rolodex file—you devise as many filing features as you like.

The Desk Organizer's notepad isn't designed to be a full-fledged text editor, but it includes reformatting capability, cut-and-paste, and the most common commands needed for basic text editing. One nice touch lets you program any one of the 10 function keys to act as a template for, say, a memo.

The calculator function is far more powerful than you might imagine. There is a standard keypad-type calculator, but you can also create formulas via the notepad for figur-

ing things like monthly loan payments, scientific equations, and rate of return on investments.

Because of the key-disk requirement, The Desk Organizer can be annoying if you have only two disk drives. A hard-disk drive, though, makes it less cumbersome to use.

SPOTLIGHT, TOO, REQUIRES a key disk, and it is copy protected: you are limited to two copies of the master disk. It sports a barebones text editor with the simplest of editing capabilities and no way to expand the editing window beyond 39 columns by 5 lines. A clock is displayed in the notepad and calculator.

Spotlight's strong point is the appointment calendar—in fact, it is the best in the bunch. You can enter meetings at any time of the day and schedule recurring meetings through the calendar. What's more, it's possible to show graphically how long a meeting will last. The appointment book can be customized in 15-, 30- and 60-minute intervals. And the alarm can be set to beep up to 10 minutes before an appointment.

The program also has a phone list that features quick access to numbers and names. Its auto-dialer can call voice numbers only. For those who want access to DOS, Spotlight offers a select group of DOS commands, including commands to format disks, copy and rename files, delete files, examine the contents of files, and sort files by date/time, extension, name, and size.

The Best Choice

As I mentioned earlier, choosing the right desk-accessory program requires that you analyze your needs. If you use the phone a lot, you will prefer a program with good telephone capabilities and a good notepad. If you frequently use a modem, you'll want a program that supports modem communications.

One thing is certain, though. Once you use a desk-accessory program, you'll wonder how you ever did without one. These mini-applications are considered adjuncts to your main applications, but you'll find them as essential to your office as a notepad and calculator used to be. □

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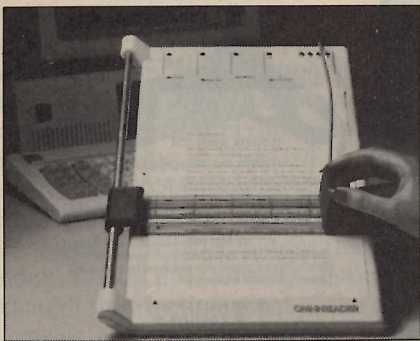


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IMAGE PROCESSING: COMPUTER AS COPIER



Oberon's Omni-Reader

Continued from page 66—
in an 8½- by 11-inch document, as opposed to the few seconds a video camera requires. It is thus inconvenient if you want to digitize many images per day. ThunderScan is also limited to flat documents on single sheets of paper. It can't, for instance, read in material from books. Moreover, you may find it irksome to have to swap the Imagewriter's ribbon for the Thunderware cartridge every time you want to capture an image.

Eyes for Your Micro

The majority of image processors currently use video cameras to capture pictures. These devices are fast, delivering images to the screen in a few seconds or less. Moreover, they give the computer something like eyes. Unlike ThunderScan or flatbed scanners, video cameras let you take shots of three-dimensional objects (say, of yourself) even at a distance.

However, camera-based image processors have drawbacks. Since video cameras are geared to the standard resolution used in television, on-screen pictures cannot much exceed the quality of a TV image. In addition, they are the hardest of the three methods to use. Camera setup requires focusing and a precise array of lights, like those that glare at you when you have a formal portrait taken. You can simplify the image-capturing process by building a permanent "stage" (a sort of miniature photo studio, with controlled lighting), and if you plan to process many pictures, this approach makes good sense. But the entire business may seem strange and burdensome to office members, and they may resist it. Finally, camera processors are more expensive than

ThunderScan, and the cameras, software, and other pieces of equipment are often sold separately, increasing the cost.

One camera-oriented image processor is PC Eye, from Chorus Data Systems (POB 370, Merrimack, NH 03054; (603) 424-2900). PC Eye is a circuit board that plugs into the IBM PC and compatibles and takes data from VCRs and laserdiscs as well as video cameras. PC Eye alone costs \$495 and together with its graphics program Imigit, \$700. You also need a video camera, which can start at \$300, and a high-resolution graphics adapter, which may run you \$500 or more. If you want to integrate pictures into a database, you'll require the \$295 Photobase program, which works with dBASE II, R:Base 4000, the IBM Filing Assistant, and similar programs.

Once you get the picture on-screen, Imigit lets you control it. Imigit is a versatile, MacPaint-like program that allows you to edit pixel by pixel, remove menus to use the whole screen, turn linked straight lines into one curved line, elasticize fonts to any length and width you want, and more. Imigit works in black and white or in "pseudo-color" by assigning a hue to each pixel based on its intensity of gray. The result is, at first, arbitrary and surrealistic: blue desks, magenta trees, faces like oil in a puddle. Of course, you can later manually substitute the proper colors and make the image more recognizable, but this can be time-consuming with complex images. Chorus Data Systems also offers true-color capacity with its Imigit Plus software and an additional memory board. The price is \$1295, not counting PC Eye, the color camera, and other vital accessories.

The speed of PC Eye depends on the resolution you want, but at any level it is to ThunderScan as a blink is to a short nap. If you use an IBM color/graphics card with a resolution of 320 by 200 pixels, you can digitize an image in less than a second, but the image's quality is nothing to brag about. Higher resolution, such as the full 640 by 400 pixels obtained with a Tecmar graphics card, takes 2 or 3 seconds and yields better results.

Another camera system is MacVision, from Koala Technologies (2065 Junction Ave., San Jose, CA; (408) 946-4483), a company well known for input devices. As the name suggests, MacVision works on the Macintosh. Like PC Eye, it will accept input from VCRs and laserdiscs as well as video cameras. You can thus freeze a frame of, say, Wally Shawn in *My Dinner with Andre*, digitize it to your screen, and print it out. MacVision's \$399 price excludes the camera but covers software written by Macintosh pioneer Bill Atkinson, author of MacPaint.

The MacVision hardware takes up little space. It is a low, vanilla-white, 4- by 7-inch box, with controls on top for contrast and brightness, and it digitizes to either the 320-by-240-resolution level of the Macintosh desktop accessory window or to the entire 512 by 342 screen. It is somewhat slower than PC Eye, taking around 5 or 6 seconds to send an image. Once you've recorded an image, you can save it as a MacPaint document and alter it. Inexpensive products like MacVision may soon let you show a videotape on the computer and edit it frame-by-frame, as more costly instruments do already.

Flatbed Scanners

At least two image processors use neither line feeders nor cameras, but flatbed scanners. Like copying machines, these devices feature a flat glass plate, or "bed," on which you place the object to be imaged. Scanners have many advantages. They offer outstanding resolution. They are small, portable, very easy to use, and relatively swift. They are also, however, quite a bit more expensive than most camera-based processors, and they clearly inhabit the high end of the market.

One of them is the Model 700, from Datacopy (1215 Terra Belle Ave., Mountain View, CA 94043; (415) 965-7900). The Model 700 works with the IBM PC XT or AT and costs \$3950—a price competitive with conventional nondigital office copiers. To operate it, you raise the cover and place your document face down on the glass plate. You can set contrast manually or make adjustments electronically through your computer.

Scanning takes about 30 seconds. As with a conventional copier, you can easily capture images from periodicals or books. The machine achieves a resolution of 200 dots per inch (dpi), far beyond the capacity of a video camera.

The Model 700 comes with software called the Word Image Processing System, or WIPS. This program allows you to add pictures to almost any application that runs with the PC XT, including spreadsheets. For instance, if you wished to slip a photo of a dirt bike into a legal memo on liability for injuries from these vehicles, you could place the photo on the right side of the page and place your prose next to it in a justified column. WIPS can also reduce or enlarge images, rotate them, segment them, and erase parts of them.

Another flatbed machine is the LaserFAX digital photocopier, made by LaserFAX (2000 Palm St. South, Naples, FL 33962; (813) 775-2737). It works with the IBM PC, XT, and AT and requires a hard disk. The black-and-white version, called the LaserFAX DS-200, costs \$2995 and takes about 30 seconds per image. A true-color version, the SpectraScan 200, costs \$3995 and takes 2 to 2½ minutes per image. Both scan and store images at resolutions up to 200 dpi.

Such resolution raises questions about the ability of monitors and printers to keep pace. The ImageWriter, for example, prints out at 80 dpi, and the Macintosh screen display is about the same resolution. Reading in a 200-dpi image that you can't display or print at 200 dpi is rather like drinking Dom Perignon with a head cold. Apple's LaserWriter achieves 300 dpi but doesn't print colors. LaserFAX president Robert Lee expects a color laser printer very soon that will take full advantage of his SpectraScan 200, yielding images of "about photographic quality." Monitor resolutions pose a more difficult problem, but Lee is optimistic about that too.

The LaserFAX has another intriguing trait: expandability. It has an open architecture, with slots inside for cards. Lee expects interested designers to devise, among other things, cards to let the

machine work with an array of different computers. To light the way, Lee's company has developed an optional LaserFAXimile card, which allows the device to communicate with facsimile machines in the office. The LaserFAX also has the TEXreader, an OCR we will look at below.

Machines That Read

The ascent from picture processing to optical character recognition involves two basic steps. An OCR must have resolution keen enough to register the tiny details that distinguish one letter from another. An OCR then needs the software to identify letters and turn them into ASCII characters.

Perhaps the least expensive and most universally compatible OCR so far is the Omni-Reader, made by Oberon International (Suite 630, 5525 MacArthur Blvd., Irving, TX 75038; (214) 257-0097). The device costs \$499 and works with any personal computer. The Omni-Reader transmits data just like a modem, at 300, 600, 1200, 2400, 4800, and 9600 baud. Hence, all you need to use the Omni-Reader is standard communications software, although special software for the IBM PC and Macintosh is available. The device recognizes four different type fonts: Courier 10, Courier 12, Letter Gothic 12, and Prestige Elite 12.

The Omni-Reader looks like a large clipboard with a ruler-like instrument across it. This instrument has a read head. You place the ruler over the line of text, draw the read head across the page, and press a button when you reach the end of the line. Then you drop down to the next line and repeat the sequence.

Like most low-end breakthroughs, the Omni-Reader is not perfect. It has two principal and related problems: speed and the need for practice. You must align the ruler precisely over the typed line or the Omni-Reader will not read it. The task isn't hard, but it slows you down. At first you may need 5 seconds per line, or slightly over 2 minutes for the average page. Your speed increases with experience. At top speed, you can input words two or three times faster than a compe-

tent typist, but you must still operate the device manually and with care. Of course, the individual who saves hours with the device will probably not carp about it.

Flatbed Readers

Two other OCRs read text automatically from flatbeds. They are from Datacopy and LaserFAX. Each is faster and more accomplished than the Omni-Reader, but neither can approach its lower price.

Datacopy uses a program called Character Image Recognition, or CIR, to turn its Model 700 into an OCR. The software comes in two versions; both read a page per minute. CIR-1 recognizes Courier 10 and Prestige Elite 12, with other faces soon to be added, and costs \$695. CIR-2 recognizes the same two fonts but also boasts an interactive learning capability, where you show the machine text and identify the text's letters; the machine memorizes the shapes of the letters and thereafter "knows" that font on its own. This way you can train it to understand almost any typeface, even handwriting, the company says, if it is uniform enough. CIR-2 costs \$1995.

The LaserFAX digital photocopier becomes an OCR with the addition of the TEXreader board, priced at \$995. This device scans a printed page in 30 seconds, and the company says its accuracy rate is very high, about 99.6 percent. On an average page, between 4 and 8 letters will seem ambiguous to it, and it will flag these with flashing cursors. At the moment, it understands only IBM Selectric Pica but can be trained to read any typeface.

Image processors and their offspring, OCRs, give personal computers new power to take rubbings of the world. They let the machine gobble up the basic information we normally use ourselves. And the falling price of laser printers, coupled with the looming advent of laser discs with their archival memory, promise to make image processing even easier and more useful. As computers are elsewhere fusing with telephones, tape recorders, and video, so here they are fusing with copiers. Gutenberg would approve. □

Continued from page 73—

on the front-end processor in the mainframe and run some communications software.

With this type of link the mainframe communicates by using the same start bits, stop bits, and parity bits that your micro uses, and it transfers data in bytes, one bit at a time. The speed of such transmission is 1200 to 2400 baud via phone lines and 9600 baud or more with a hard-wired direct connection.

The clear advantage of this type of link is that it's cheap. Micros can tie in to the mainframe from a remote site using only a modem or a serial card and standard communications software. Nothing additional is needed. And if mainframe software is written to exchange error-checking messages, then a similarly equipped micro can download selected mainframe files with relative ease and accuracy.

Asynchronous links are slow, however, and they don't let micros talk to IBM hosts that are locked into synchronous SNA/SDLC (Synchronous Data Link Control) or Bisync protocols, two popular IBM mainframe protocols. For faster synchronous communications, you have to opt for a terminal-emulation package, usually to the tune of \$750 to \$1000 or more per unit. Terminal emulators let personal computers mimic the characteristics of mainframe-linked terminals like the IBM 3278 and 5251 or the DEC VT100. A terminal-emulation package combined with a file-transfer program translates mainframe data into ASCII code and sends it via coaxial cable to your micro. Similarly, it takes data expressed in ASCII code from your micro, translates it to the mainframe code, and sends it to a host computer.

Terminal emulation allows a mainframe to dump high volumes of data—often a whole screenful at a time—across a coaxial cable or dedicated phone line at speeds up to 19,200 baud without losing any of the data. It's the preferred method of communication in large organizations. Moreover, if micros are connected synchronously, then no additional hardware or conversions are required on the mainframe side.

Restricted Capabilities

But the drawback of terminal emulation is that it restricts the processing capabilities of the micro. A terminal emulator is designed to make your computer act like a dumb repository of information—except that you can grab a screenful of data and save it on a disk or print it. (Some people call this "smart terminal emulation.") Most micro users with terminal emulators must reformat downloaded mainframe data for specific micro applications. You may be forced to write a BASIC program or buy additional software just to get your information into usable form. Otherwise, the data will just sit there waiting for you to rekey it into your application program.

Some vendors are dealing with this limitation by expanding the capabilities of their terminal-emulation packages. For example, the popular Irma board (the Irma Decision Support Interface, from DCA in Norcross, GA) gives you limited ability for file transfer. It can access selected mainframe files in the IBM VM and MVS operating systems and save downloaded files in ASCII code (text) or binary format. And DCA has expanded the Irma product line to include a board that allows asynchronous protocol conversions over remote phone lines. But whether you opt for an Irma board, a PCOX board (CXI Corp., Palo Alto, CA), a Blue Lynx board (Techland Systems, New York City), or any other type of board, terminal emulation is still only a low-level link strategy.

Application Interface Links

Application interface links let your micro access subsets of files in specific mainframe application programs. These higher-level links almost invariably use terminal emulators to establish the basic physical connection. They also employ conversion templates, software formatting schemes, and file extraction utilities for selecting and reformatting files. These links are "two-package solutions": separate micro and mainframe programs produced by the same vendor.

One example is McCormack & Dodge Corp.'s (Natick, MA) Interac-

tive PC Link, which lets IBM PCs access information in McCormack & Dodge's financial applications and other applications that run on IBM System 370 and 4300 mainframes. Another application interface link is Management Science America's (Atlanta, GA) Executive Peachpak II with ExpertLink, which links your microcomputer to mainframe data stored in the package's accounting modules. Processing is shared. You can, for example, enter and validate budget transactions with your micro, then upload the information to the mainframe budget module. ExpertLink is pricey: \$3000 per micro package, less with volume discounts. Mainframe modules run between \$80,000 and \$100,000 each.

Another set of products, IBM's recently announced Personal Decision Series (PDS), provides a link between a specific application series (five software programs on the PC and PC XT) and the IBM System 370, 30XX, and 4300 mainframes, as well as System 36 minicomputers. A separate Business Management Series (BMS), a group of accounting and inventory programs for the PC, also exchanges files with the PDS system. The host computer requires a separate Attachment software package: a System 370, for example, requires either Attachment/MVS for \$20,000 or Attachment/VM for \$16,000. The corresponding micro package for connecting to a System 370 mainframe costs \$200.

Universal Links

Still higher-level micro-to-mainframe links are more universal than application interface links, or at least they purport to be. Those known as database interface links allow you to select data from a variety of mainframe database file structures, then download that data into your micro for manipulation and analysis. These links also let you upload highly refined spreadsheets or other information in formats that mainframes will accept.

Database interface links go beyond specific tie-ins to one vendor's application programs. Sometimes they are termed generic because they're capable of reading—or summarizing—data files from different main-

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LINKS MICRO-TO-MAINFRAME

frame file structures. Many offer simplified commands and two-package solutions.

Database interface links, however, have varying capabilities. One of the most powerful, PC/Focus (Information Builders Inc., New York City) is a database management system, a mainframe-level applications development tool, and a report writer. It lets you write queries to a mainframe and selectively extract data from Focus database files or other database files in the IBM environment. It can also accept database transactions entered and validated locally and then send them to a mainframe for processing. Its data files are structured the same way for both micro and mainframe. You can build databases and other applications on either your micro or a mainframe by using an English-like programming language. PC/Focus's price: less than \$1600 per package. It requires a terminal emulator.

Other link packages in this category work differently. Informatic General's (Canoga Park, CA) Answer series, which includes Visi/Answer, dBASE/Answer, and Lotus/Answer, cooperates with a \$30,000-to-\$45,000 mainframe file extraction package, Answer/DB, that will read virtually any file written in common mainframe file structures. Answer/DB can read files in IBM's IMS, Cullinet Software's ICMS, Cincom Systems' Total, and Software AG's Adabas, for example. The corresponding Answer micro packages let you decide, off-line, which data to look at. You select the conditions, fields, and types of data sorting desired, then send your completed request via Irma or a similar board to the mainframe, where your request is executed. The data is downloaded to your micro in formats that VisiCalc, dBASE II and III, Friday, Framework, 1-2-3, and Symphony can use.

Another link, Cullinet Software's (Westwood, MA) Goldengate package, exemplifies a variation of this strategy. The \$795 package is a stand-alone integrated series of micro applications which, according to its producers, can be equipped with the capability of directly uploading and downloading data from

Cullinet's own mainframe product, the \$150,000 Information Center Management System (ICMS). This package summarizes data on the mainframe and presents it in a format that is understandable to personal computer users who aren't familiar with corporate mainframe language.

Given the proper commands, Cullinet's mainframe package, like some of the more general links, can read databases like IBM's IMS and DL/1, as well as data produced by outside sources. The file summaries are then converted into Cullinet's own database format. This capability, combined with a microcomputer package called InfoLink (an add-on to the Goldengate package), enables micros to exchange files and talk to one another using ICMS as the host. They can also manipulate data downloaded from the host. A still newer capability integrates ICMS with 1-2-3 and Symphony.

Link Now or Later?

There's so much new technology being developed in the micro-to-mainframe link arena that our functional categories may well be supplanted in the near future. For the micro user of today, the uncertainties of the link marketplace pose some unusual problems. Do you wait or not? Is it better to plunge in and buy a mainframe file-extraction package that costs anywhere from \$30,000 to \$150,000 and also pay hundreds to thousands of dollars for a corresponding micro package, as well as \$750 or more for a terminal emulator? Or do you wait for cheaper and more technologically compatible solutions?

In some cases, you may not have the option of waiting. And in any case, choosing a micro-to-mainframe link is usually a group decision made by managers, technical specialists, and mainframe systems people who know the capabilities of their mainframes and are intent on keeping their corporate data well secured and restricted from as many people as possible, including you.

For now, one of the most reliable micro-to-mainframe links is readily available for most large computers—the asynchronous link. Although

asynch links are relatively slow, some asynchronous mainframe ports can be set to run at speeds up to 9600 baud. Asynch links also let several different types of microcomputers tie readily into a mainframe system. And asynch links often cost less than a leased full-time line for synchronous communications. In fact, if you have comparatively small amounts of data to shuttle back and forth and speed is not of paramount importance, then "talking ASCII" may be ideal.

The synchronous decision, on the other hand, begins to look better when you're talking high-volume traffic and have a great need for high-speed service and networking. In that context, terminal emulators can be adequate. In fact, low-level terminal emulation is the most common method of connecting personal computers to an IBM host. Emulation lets managers and executives maintain off-line processing power and still tie into corporate databases occasionally. And micros are frequently cheaper than dumb terminals.

Many companies, on the other hand, choose the more powerful but more expensive route of application interface links. Some buy a specific link to their own mainframe-resident accounting or budgeting package, then download selected financial information to their micros to prepare summary reports and budgets. Some organizations buy high-level links but restrict uploading of files because they doubt the security of current link products.

One Final Word

Mainframes and micros may eventually integrate seamlessly with each other. Many vendors are promising that and more. For now, we all need to remember that micro-to-mainframe links are like early versions of the telephone and telegraph. The nitpicking points of operation have yet to be refined, but the systems work and offer immense potential for handling reams of data. With a growing demand for such wonderfully inventive products, it's only a matter of time before the gap between micros and mainframes is closed. □

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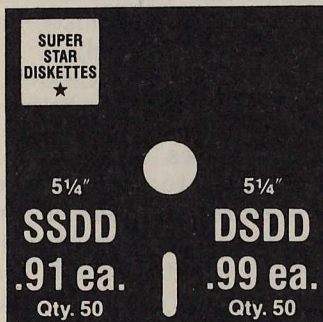
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REACTIONS

A showcase of comments, kudos, outcries, opinions, gripes, and grumblings

Needless Regulation

Matthew McClure's article about our on-line freedom (June 1985, page 76) was timely and thought-provoking. I wonder how many readers are aware of the original rationale for all this government regulation—and how irrelevant it is to our activities with computers.

In the beginning, there was "AM Radio," the first broadcast medium. Regulation was nil. As a result, stations proliferated uncontrolled and very soon started to interfere with each other. The situation became intolerable. So by general agreement, channels were assigned, licenses were granted, and the whole mess was quite satisfactorily sorted out. It might not have been the only way, or even the best way, to do the job—but it worked well enough.

Now we have communications by cable, by telephone line, by "tight" microwave beams, and even by untappable optical fibers. *None* of these methods of communication interfere with each other. *None* of them impose any bandwidth limitation that cannot be overcome by buying equipment for more channels: i.e., bandwidth is a hardware limitation, not one imposed by Nature. In short, these methods are totally different from the original broadcasting technology, but the regulators' mentality hasn't changed a bit.

It seems as though officialdom has an inborn itch to regulate whether regulation is needed or not. AM (and later FM) broadcasting give bureaucrats control over frequency, power, radiation patterns, and even to some extent the content of transmissions. *None* of these controls are required for effective and orderly computer communications. But the regulators have had their taste of power, and they aren't about to give it up.

What can we do about it? We can

make our opinions known and fight in court when there is no alternative. But in the long run we must be able to recognize the "Big Brother" mentality in political candidates—and use our votes accordingly.

CHARLES H. CHANDLER
MALDEN, MA

Threat to BBSes

I would like to increase your readers' awareness on the subject of Senate Bill 1012, which relates to activities on computer bulletin board systems. Basically the bill states that anyone who knowingly places or any owner/operator who knowingly permits placement of personal or private information (i.e., telephone numbers, credit card numbers, etc.) on a public bulletin board system or otherwise makes the information available electronically to the public *without written permission* by the owner of the information is guilty of a public offense.

If this bill is passed and enforced, the police could legally confiscate all my equipment and place me under arrest for allowing a user to place a message containing his phone number and address (i.e., so that I could send him some information) without his written permission.

I hope I am speaking for all public bulletin board users and operators by saying "I oppose SB 1012." I am afraid I will have to cease to operate my bulletin board if this bill is passed and I know for a fact that many other bulletin boards will cease to operate also.

Many of my users exchange addresses and phone numbers, but they don't leave me their written permission every time they do so. In other words, it would be impossible to operate under these conditions.

PAUL LEVY
COMWORX RBBS
ENCINO, CA

Privacy Protected

Your June 1985 issue (page 36) carries an article by William Hoffer on computers and genealogy. It includes a couple of complimentary paragraphs about the Genealogical Library of The Church of Jesus Christ of Latter-day Saints, which we appreciate. However, the following incorrect and misleading statement was made: "More than a billion names are now on file there, *including yours and mine*." It is the last phrase we take issue with. We take great care to protect individual privacy by not making records of living people available in the library. Our contractual arrangements with archivists require a cutoff date when we microfilm records, usually 1900 or earlier. It is not our practice to include data on living persons in the collection, a fact we try to make very clear in all our contacts with the public and the press.

A correction of this misstatement is important in a world where many people are concerned about their personal data being publicly available.

THOMAS E. DANIELS
MANAGER, PUBLIC RELATIONS
THE CHURCH OF JESUS CHRIST
OF LATTER-DAY SAINTS
SALT LAKE CITY, UT

Better Tools

John Strommer, in his essay "Subversive Word Processors" (May 1985, page 160), makes several vague complaints about word processors making things too easy for the writer. What a strange complaint. Is a piece of writing automatically better because the author suffered pain and inconvenience in producing it? The Puritan Work Ethic never goes away.

At the very end, in typical Yuppie fashion, he tosses it all off with a clever put-down, leaving you with the feeling that word processors and

computers are all a bunch of technological hokum. If that's his conclusion, he hasn't made his case, and most of this arguments actually point the other way.

Perhaps his greatest error is believing that teaching students how to use word processors is a substitute for teaching them how to write. Word processors are nothing more than tools that make the job easier for those who know what they are doing.

In a similar way, an expensive 35mm camera can take beautiful photos—but the operator must have skill, taste, and good judgment. Those are human abilities that are passed on through interaction between teacher and student.

No, word processors are not "subversive," and "too much computer power" doesn't "undermine a writer's efforts." They are simply better tools, just as the typewriter was a better tool than the goose quill. Word processors don't remove style; bad writers remove style, and always will, regardless of the tools.

STEVEN T. BIRCHALL
MILFORD, NH

Volatile-Market Casualty

I want to thank you for the "real help" provided in "Money Management Software—Real Help for Your Personal Finances" (March 1985, page 60). I purchased the Complete Personal Accountant from Futurehouse. They cashed my check, closed their office, and disappeared into the night. *Popular Computing* and Futurehouse have together done an outstanding job of reaffirming my opinion of the value of 99% of the human race.

—G. R. SWIFT III
ATMORE, AL

The software market is one of the most dynamic and volatile ones around. There is nothing we can do about that. But what we can and do do is to choose very carefully the products we review, either individually or as part of a comparative review or broad-based article. We choose these products on the basis of their functionality, usefulness, quality of design, and a host of other factors, including the company's demonstrated stability. We had no

News vs. Reviews

In the rapidly changing world of high technology, industry watchers are constantly tempted to write about prerelease products. And to satisfy their preoccupation with the latest, greatest machine or software package, some of them shove information out without much evaluation, comment, or concern over its importance to you.

Sometimes, these hasty articles are called "reviews," but they're not. Simple logic points out why. The production and mailing cycle of a magazine takes almost two months. If both an article that claims to be a review and the product show up at the same time, that so-called review had to have been completed at least two months earlier. That means that the writer was *not* working with the same version of the product that you are thinking of buying.

When a magazine looks at a product that long before it is released, all that can be done legitimately is to describe its features, identify the problems that are by definition always inherent in an unfinished product, and speculate on its success. Undeniably, that information is interesting, but it isn't very useful when you're trying to decide whether or not to spend your dollars on something that should make your work a little easier. That's why that kind of information is news and deserves to be treated as news.

Popular Computing makes a clear

distinction between news and reviews. A review should critically examine a finished product, looking at how well it fulfills the promise it makes. That means the review must be done on the same version of a product you can buy, by someone who has experience with similar products and who would be a potential purchaser of that product. To accomplish this task takes more than a couple of hours playing with a prototype version or watching a demo conducted by the manufacturer.

Our cycle goes something like this. First we report information about new products in the news section of *Popular Computing* and in the electronic edition of *Popular Computing* on "Participate" on The Source. Next we get a production version of the product and send it to a qualified reviewer. Then we give the reviewer enough time to work with the product to fully understand its strengths and weaknesses. Finally the magazine's editors work with the product and edit the review accordingly to make sure the reviewer covered all the items that are important to you.

With hundreds, sometimes thousands, of your dollars at stake in a product purchase, we won't compromise our "review" standards. We believe that's the only way to treat our readers. We also believe you shouldn't settle for less.

PAMELA A. CLARK
EDITOR IN CHIEF

reason not to include the Complete Personal Accountant in our article on home finance software. Through extensive use of the package, our reviewer found that the product bore out the company's claims about it. It was a good product. Unfortunately, Futurehouse Inc. became another casualty in a still maturing industry.

—B.C.

The Literacy Game

I enjoyed Jerry Pournelle's article on computer literacy (May 1985, page 45). It was so lucid and well-reasoned and with such immaculate syntax it made me proud to think that such a writer had emerged from the muck of science fiction. Besides, I agreed with the ideas. My granddaughter is a college graduate who got her AB

without learning to type. She wondered if I would teach her to use a word processor. My answer was that I could teach her in a day if she would learn to type. After reading Jerry's article I think I should buy her a program to teach her typing on the word processor. His remarks about literacy first, computer literacy second, are irrefutable.

—BOYD BRADFELD UPCHURCH
COSTA MESA, CA

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Computer Phobia

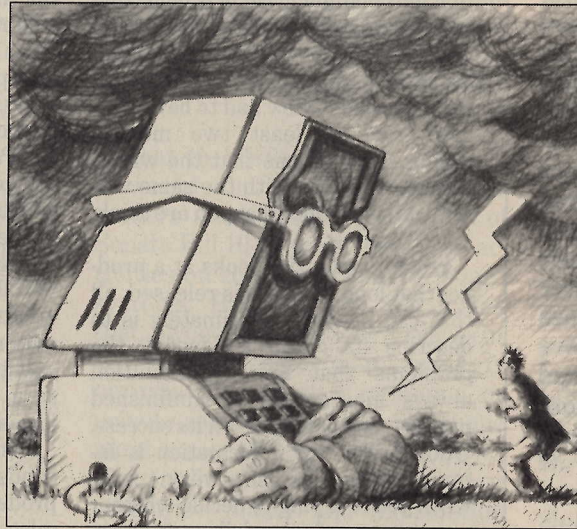
Someone in your organization is computer phobic. And it's costing all of us a lot more than you think.

Computer phobia—fear of computers—is a very real phenomenon that has spread quickly since the introduction of microcomputers. Computer phobics vary in the intensity of their discomfort, ranging from mild apprehension to strong aversion. In general, phobics fear a loss of control around computers, lack a basic understanding of how the machines work, and worry that working with computers will reveal their “stupidity.” These fears and worries are strongest when the phobic must face computers on the job.

Fear generally translates into avoidance of the feared object. In the case of fear of computers, that means a loss of office productivity. One study estimated that as many as one-third of the 45 million information workers in this country possess some degree of computer phobia. If these phobic employees earn an average of \$25,000 a year and their productivity is cut by only 5 percent, the annual loss would be more than \$18 billion.

Loss of productivity is not the only cost of computer phobia. Many businesses find that personal computers encourage creative thinking and innovation. But if an individual views a computer as a threat, the psychological processes that give rise to creativity will be inhibited. Computer phobics don't come up with innovative methods of accomplishing current jobs, nor will they develop creative new procedures.

*Not only is it real,
but it's costing all of us*



Any attempt to allay fear of computers must begin with a recognition of *who* is phobic. Three psychological issues come into play: motivation, knowledge, and competence. First, computer phobics are motivated by a belief that the computer is potentially *harmful*—they fear a loss of control or a catastrophic mistake. Second, computer phobics do not understand computers in any meaningful way, usually viewing the machines as magical black boxes that only programmers understand. Third, computer phobics doubt their competence for using computers; they give up after reading a few pages of the manual. Attempts to diminish computer phobia should address all three problems.

Although little scientific research has been done, there is some agreement on successful ways to combat computer phobia. First, a business manager must recognize that computer phobia is a serious concern

and not just a little worry that will go away. Second, computer learning needs to be broken down into small, discrete, nonintimidating tasks. Phobics can then progress to more difficult tasks by building on earlier successes. Third, phobics are reassured by watching other computer novices using the machines. Observing and imitating a fellow worker who seems only slightly more proficient frequently instills confidence.

Some people understand the computer only after they have mastered the machine, but others want to know what a computer is and how it operates before they begin. These

people must be taught basic computer concepts and terminology if they are to lose their fear of the machines. Expressions that introduce computer concepts by comparing them to something familiar are particularly important tools; for example, the widely used electronic file cabinet metaphor clearly illustrates how you can use a computer to store and retrieve information.

These suggestions will not instantly transform computer phobics into computer lovers, but that's not really the goal. You're looking for expressions of ease around the machines: more time spent at the keyboard, taking initiatives that involve computer use, or just talking with coworkers about the computer. This kind of comfort means happier, more productive employees.

—SCOTT T. MEIER

Scott T. Meier, a postdoctoral fellow at the Missouri Institute of Psychiatry, works with computer applications in mental health.

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